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9. ABSTRACT

This country profile of the Republic of Panama provides a study of its health conditions and their impact upon socio-economic development, and a model for the definition and evaluation of its health problems. In general, the approach has been to review and analyze readily available data in order to identify the most prevalent and severe as indications of disease occurrence and spread. Part One of this report is an analysis of the physical-geographic and social psychological environment within which disease arises -- the living conditions contributing to poor health; the problems of over-burdening health care resources by a growing population; the diseases relating to socio-economic development; the economic and social costs of these diseases; and the malnutrition complicating other problems and as a problem within itself. Part Two identifies the resources of the health sector, viewed from the perspective of both recipients of care and the providers of care -- domestic and foreign agencies and formal activities of the health sector; recent health planning activities in relation to present health conditions; and finally a summary of the demands of the population upon the health sector, which describes the factors affecting these demands and assesses the current use of the health resources in light of these demands.

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HEALTH, EDUCATION, AND WELFARE

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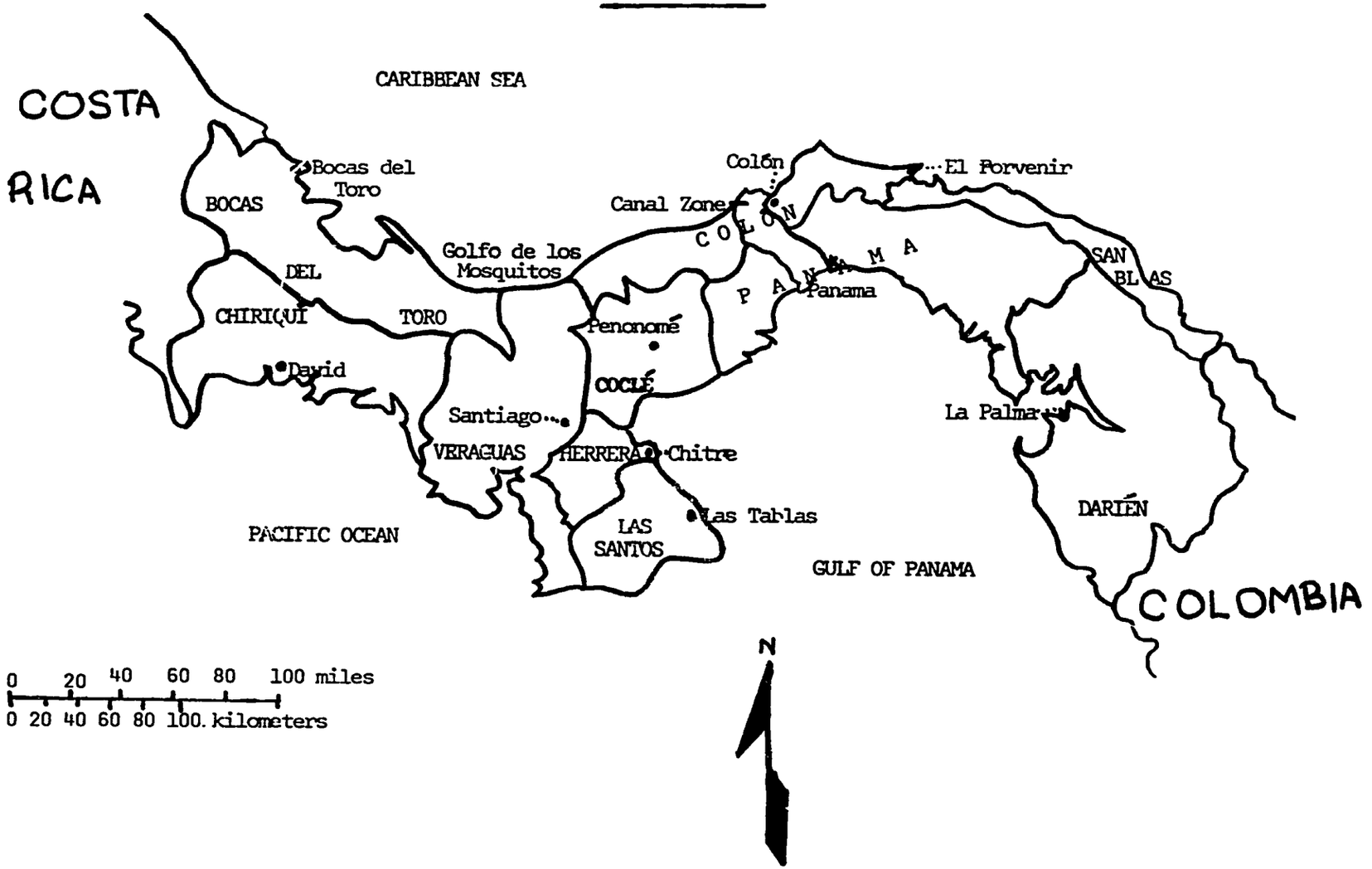
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I: P A N A M A

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This volume is the first in a series of studies sponsored by the Agency for International Development aimed at identifying crucial problems in international health and potential roles for development assistance. It represents a first attempt to establish a methodology for the examination of health and the health sector in terms of its contribution and relevance to the economic and social development of selected countries. It is based upon the assumption that conditions and realities of the world are comprehensible and susceptible to ordering through the application of objective thought. It is hoped that this edition, and those to follow, will increase the capability of donor agencies and health professionals to deal with planning and evaluation of health programs in a context which relates such programs to the broader national and international effort to improve the well being of mankind. In this light it is to be accepted not only as a thoughtful first attempt, but as an effort to view developmental health assistance from a broader and more realistic perspective.

S. Paul Ehrlich, Jr., M.D.
Director
Office of International Health

April 1, 1972

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This analysis of the relationship between health and socio-economic development is the first in a series of Country Profiles in selected developing countries. It was prepared at the request of, and made possible through the support of the Agency for International Development. The purpose of the individual country reports is to assist A.I.D. in the identification of the relationship of health to socio-economic development.

The best available information has been utilized as the basis for analysis and judgment. The selection of data and the judgments derived there from are the responsibility of the authors. As new data of significance become available revisions will be made.

Gratitude is expressed to the many individuals who provided consultation and advice in the preparation of the report. Considerable assistance was received from international organizations as well as from various U.S. Government agencies. Appreciation is extended to the staff of the Office of International Health for their close interest and support, and to the staff of the Division of Planning and Evaluation for their participation and dedication. A special word of thanks is due to the secretarial staff for their perseverance and patience in the preparation of the report.

Paul O. Woolley, Jr., M.D.
Washington, D.C.
May, 1972

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LIST OF ABBREVIATIONS

AID (or USAID)	Agency for International Development
APLAFA	The Panamanian Family Planning Association (a private organization in Panama)
CIAP	Inter-American Committee on the Alliance for Progress (committee of the Organization of American States) (OAS)
IDA	Institute for Defense Analyses
IDAAN	National Water and Sewerage Authority (autonomous agency of the government of Panama)
INCAP	Institute of Nutrition for Central America and Panama
IVU	Institute for Urban Housing (autonomous agency of government of Panama)
LEA	Special Laboratories for Analysis (operated by government of Panama)
PAHO	Pan-American Health Organization
PUMAR	Rural Mobile Health Program
SNEM	National Malaria Eradication Service (operated by the government of Panama)
UNICEF	United Nations Children's Fund
WHO	World Health Organization

PREFACE

This country profile of the Republic of Panama has been prepared within the Office of International Health at the request of the United States Agency for International Development. It is the first report of this type developed for the purpose of providing a study of the health conditions of a country and their impact upon socio-economic development, and a model for the definition and evaluation of the health problems of a population. The country profile is based upon the belief that health has a social and personal value in itself, that health can be seen as a goal, and that the achievement of a reasonable status of health is also a means for society to progress in terms ordinarily described as socio-economic development. In this context, health is one of the several factors necessary for the development of manpower potential, education, and industrial and agricultural growth. Illness and death, the negatively measured deviations from health, are of concern in humanistic terms for the suffering engendered and in economic terms for the burdens they place upon the society.

Our concern for the health of a population is expressed here in terms of both economic and social considerations for focus upon the real impact of health problems. Traditionally, varying sectors have been forced to compete with one another because of the scarcity of total available resources; the aim of this study is to point to those areas of common concern among sectors of the economy. It is quite clear that many government officials in Panama are well aware of the problems and are working diligently to solve these problems. The Ministry of Health is led by a vigorous and enthusiastic minister who has significantly redirected the activities of the Ministry and has brought about major changes in the health care system of Panama. Accordingly, the suggestions found in this study are directed at those who are able to function in a coordinating capacity; for the Government of Panama this includes both sectorial and national planning agencies; for the external sources this includes those who provide bilateral and multilateral assistance and regional advisory groups.

In general, the approach has been to review and analyze readily available data in order to identify the most prevalent and severe diseases. These diseases are viewed as manifestations of even more basic problems. In this sense, our attention has not been specifically directed at the cases of individual diseases, but rather at the pattern of disease occurrence and spread within a population.

It is widely recognized that significant inaccuracies exist in all health data, and this is true for the data available for this study. Of the available options of dismissing the data, or utilizing it is to make reasonable judgements within an acceptable margin of error, we chose the latter course. This made it necessary to define the extent to which major inaccuracies in data would alter the identification of problems and the evaluation of their impact upon the society. Since our interest was in protecting or improving the health of populations at risk (rather than identified individuals), and our constraint was to analyze how this might be done allocating limited resources to basic problems over a relatively long period of time (rather than at a given instant), it was determined that errors as great as 20% or more in data reporting morbidity and mortality would not significantly alter the decision-making process.

Realizing these inaccuracies, we have identified the elements of the current health status of Panama that impede the socio-economic growth of the country, while at the same time we have considered the effects of policies in other sectors of the economy on the health status. The interrelationships between health and other sectors of the society have been identified in order to demonstrate that policy decisions and program activities of any sector have significant implications for other sectors, especially health, and that these implications should be brought to the level of conscious decision-making.

In addition, a significant effort has been made to demonstrate the costs of disease to Panama. The costs of a disease far exceed the direct costs of prevention and care. A society incurs costs of lost wages, wasted calories, government payments for death and disability, and unrealized benefits from human investments.

SUMMARY AND CONCLUSIONS

The definition of the health problems of a country includes more than a listing of the major disease problems. A complete definition should include an analysis of the physical-geographic and social-psychological environment within which disease arises--living conditions that contribute to poor health, the problems of over-burdening the health care resources by a growing population, the diseases that relate to socio-economic development, the economic and social costs of these diseases, and the malnutrition that complicates other problems and is a problem within itself. These factors are presented in Part One in the chapters LIVING CONDITIONS, POPULATION TRENDS, NATIONAL HEALTH STATUS, THE COSTS OF DISEASE, and NUTRITION.

Part Two identifies the resources of the health sector. The resources are viewed from the perspective of both the recipients of care and the providers of care. These are presented in the chapters OBSERVED HEALTH CARE RECEIPT, and HEALTH RESOURCES respectively. The following chapter, HEALTH CARE ADMINISTRATION, describes the domestic and foreign agencies and activities that function within the health sector on a formal basis. The chapter, HEALTH PLANNING, summarizes recent health planning activities in relation to the present health conditions. Finally, ADEQUACY OF HEALTH RESOURCES summarizes the demands of the population upon the health sector, describes the factors that affect these demands, and assesses the current use of the health resources in the light of these demands.

PART ONE: DEFINITION OF THE PROBLEM

LIVING CONDITIONS

Living conditions in parts of both urban and rural areas are not conducive to good health. In the urban areas, housing is poor, crowded, and unsanitary for a significantly large number of persons in the growing urban lower class. The rural areas suffer primarily from lack of proper sanitary facilities, particularly water and sewerage facilities. While 100% of the urban population have some access to a potable water supply, with 84% of these having home connections, only one-third of the rural population have any access to a potable water supply system. In the urban areas, 88% of the population have some available sewerage system, although in the slum areas these systems are probably overloaded. In the rural areas, only one-third of the population have even minimal sewerage systems available to them, these being primarily in the form of latrines. Many rivers and streams are grossly polluted with human and animal waste.

Other aspects of the environment also prove to be hazardous. The sanitary facilities in most schools are inadequate and not conducive to learning good health habits. Many places of employment also lack sufficient sanitary facilities and, in addition, contain dangerous equipment and make little provision for workers' safety.

The living conditions for a given individual may be dangerous, or at least unhealthy, in the home, job, or classroom. This is particularly significant considering that included in the ten leading causes of death in Panama are enteritides, tuberculosis, and accidents. Inadequate water and sewerage facilities, crowded living conditions, and dangerous working equipment, respectively, are major contributors to the development of these health problems which are responsible for a large proportion of deaths and disabilities in Panama.

POPULATION TRENDS

In 1970, the population of Panama was 1.4 million. With a growth rate of 3.3% per year, by 1990 the population will have doubled, and by 2001 it will have tripled. The absolute number of the population is not significant alone. At present, Panama has one of the smallest populations in Latin America. It is the impact that this rapid growth will have on many sectors of the economy that is cause for concern.

The urban population is concentrated in the cities of Panama and Colon. The rural population is largely concentrated along the Pacific seacoast where agricultural lands are poor.

This pattern of settling has occurred for historical reasons.

The rapidly increasing population will place additional burdens on already limited services--health, education, employment, housing, and sanitation. As the population grows, the younger groups are increasing in their proportion to the total population, so that persons of working age have to provide for a relatively larger number of dependent persons. In addition, in recent years the urban populations of Panama City and its surrounding areas have grown significantly more rapidly than any other part of the country. This growth is attributed primarily to in-migration from the rural areas, and if it continues as expected, combined with the natural increase, the services of these urban areas will soon be drastically overloaded. The problems of food distribution may also be expected to increase as the urban population expands.

Projections for a decreasing growth rate indicate that it is possible to slow down the growth given the introduction of certain family planning programs. The basic health services, although inadequate, should offer family planning services. In addition, to provide for the growth that will occur regardless, current services in all sectors must be increased at a greater rate to provide for the future.

NATIONAL HEALTH STATUS

The national health status of Panama is derived primarily from available mortality and morbidity data. With such information there is the hazard of misplaced emphasis upon certain diseases and unawareness of significant problems not identified within the reporting system. Nevertheless, from this data certain significant observations can be made.

Mortality data emphasizes the transitional nature of Panamanian society. The first four leading causes of death for 1968 include: (1) ischemic heart disease (2) cancer (3) accidents and suicides, and (4) stroke. Of these, heart disease, cancer, and stroke account for 30% of all medically certified deaths and indicate a relatively advanced stage of development of the country. The remaining six leading causes of death are essentially a collection of communicable diseases, notably pneumonia, enteritides, tuberculosis, and another large group including diseases of the new born--birth injuries, anoxia, and other causes of mortality in infants less than one year of age. The tenth rank is occupied by other diseases of the heart and by congenital anomalies. The ten leading causes of death account for 65% of all deaths medically certified in 1968. It is significant that a large portion of these conditions are preventable and treatable, thus indicating areas in which public health activity would be productive.

Mortality data broken down into specific age ranges reveal that for children the childhood diseases tuberculosis, enteric infections, and pneumonia are responsible for a large portion of the deaths. These conditions are complicated by the prevalent malnutrition observed in this age group. Accidents are also significant. With appropriate immunization, safe water supplies, accessible medical care, and a reasonable state of nutrition, deaths in children could be dramatically reduced.

In the young adult and working age population, accidents are a major cause of mortality; where not so severe as to cause death, accidents are responsible for many disabilities which impose a burden on the economic and health care systems. In this age range, tuberculosis is also a leading cause of death. The chronic debilitating nature of the disease accounts for long-standing severe disability before eventual death with a subsequent, large cost to the society. In this age group, deliveries and complications of pregnancy are also a problem, relating directly to the maldistribution of medical care.

For those over age 45, the leading causes of death are heart disease, cancer, and stroke. Here the burden of care rests primarily upon the therapeutic resources of the health care system, and practical preventive techniques will not influence this age range as dramatically as they will younger groups.

Specific data from communicable disease and information regarding the medical certification of these deaths allow certain assumptions to be made regarding the use and availability of medical care. Generally, medical attention is much less available in fatal cases of a rapidly evolving disease than in cases of slowly developing disease. The limited medical

certification of deaths from childhood diseases suggests nonavailability of health care services and may also reflect the parental attitude toward childhood diseases, with the general assumption that these are self-limited diseases.

For all of the communicable diseases, children are a particularly high risk. The complications of malnutrition increase the severity of the disease for the child often leading to death or permanent disability. For the adult, communicable disease is important for the cost to the individual and the society. It is significant that in most cases such diseases are preventable or at least treatable.

Deaths from the communicable diseases indicate that severe problems exist with housing, environmental sanitation, and the levels of nutrition. If these conditions were improved and immunization programs increased, a significant portion of these deaths could be prevented. This is particularly important considering the exceedingly high infant and childhood death rates, along with high birth rates, with the result that the society spends a major investment in time, care, and money in the production and partial raising of chilren who die before they become economically productive.

The data from medical consultations and hospitalizations support the identification of health problems in Panama. The most frequent cause for consultation is dental disease; ranking second are the helminthic infections. Other large volume consultations were for diseases of the respiratory tract, accidents, enteritis, and diseases of the genitourinary tract. It is apparent that a majority of the consultations could be more effective if basic preventive measures were the central core of services about which diagnostic and curative services were built. The diseases which occupy this large portion of consultations are preventable and could be altered through emphasis on good nutrition, hygiene, and accident prevention.

It must be noted that more recent trends in providing medical services are toward preventive and simple care, and providing easier access. The Ministry of Health has established Centers of Health where such care is given on a regular basis in the patient's immediate community. Hospital care is now based upon referral from these centers.

Hospitalization data also support the above pattern. In addition, the conditions related to pregnancy (normal delivery, complications of pregnancy, and abortions) are important, ranking as the most frequent causes of hospitalization. If the hospital admissions are representative of the disease problems of the population, there must be a great wastage of pregnancy.

The average short duration of stay in the hospital in the nonpediatric category reflects the acute problems, especially pregnancy and accidents, of the population. Pediatric admissions consume a large number of days, reflecting the fragile health status of the pediatric age group. From the patterns of usage of the Maternal and Child Health Centers it appears that mothers and children could be better served, and family planning programs could be extended more effectively, if the basic health services were expanded. Through such services, more preventive and other necessary care could be offered on a continuing basis.

In addition to the data that describe the general health problems, the distribution and mortality experience of the population from tuberculosis, malaria, and enteric infections are discussed in more detail. The discussion is not presented to place particular emphasis on these special disease problems; rather, it serves to illustrate the way in which certain diseases are manifestations of more basic social and economic or geographic problems.

Tuberculosis is one disease indicator of the socio-economic status of a population in a given area. The disease is particularly noted in the provinces of Colon, Veraguas, and Darien. Especially in Colon Province, it is probably a manifestation of crowded urban slums. In Veraguas and Darien Provinces, the rising prevalence of the disease directly correlates with a decreasing physician/population ratio. This is significant for Darien Province because the final portion of the Pan-American Highway is to go through this province. For the country as a whole, the disease afflicts a large portion of the working age population, thus placing an economic burden on many individuals and on the society. It is also dangerous because of the risk to the rest of the population and especially to the very young and to the aged.

Malaria is also important for the impact it has upon the working population. In addition, it has been shown that the presence of the disease in many areas of the country has impeded the economic growth by limiting the development potential of these areas and by dramatically reducing worker productivity and agricultural output.

The enteric infections are responsible for high morbidity and mortality rates, especially in children. They are complicated by and further complicate the marginal nutritional status of many in the population. Due to successive infections throughout a life-time, the population may never realize its full potential. The prevalence of the disease correlates directly with the sanitary status of the environment, including the safety of food and water supplies and the disposal of sewerage and wastes.

COST OF DISEASE

Disease has been measured traditionally in terms of the human suffering it causes. While such measurement is essential, it does not identify the full burden placed upon a society by disease. The costs of a disease to a society can also be expressed in terms of the economic costs that result from the presence of the disease. By estimating these costs, emphasis is placed upon the economic losses that a society suffers when the population is afflicted with disease.

These costs have been figured here using the direct and indirect costs of disease. Direct costs include the expenditures of individuals, the government, and international agencies on the diagnosis and treatment of a disease. In this study, direct costs also include the figures for prevention as these are not reported separately. The indirect costs include the costs of lost wages and lost productivity; the costs attributed to increased caloric needs of all the ill population, working and non-working; the costs attributed to loss of potential earnings because of premature death; the costs attributed to investments in individuals who die as a result of the disease; and the costs to the government through Social Security payments.

The direct and indirect costs of tuberculosis, enteric infections, and malaria are presented. These particular diseases are used because they represent a significant portion of the disease load for Panama. Information regarding their caloric costs was available and they relate directly to the problems of development or the geographic and social characteristics of the country. The methods applied for calculating the costs of these three diseases could be used for other diseases to further demonstrate the impact of disease upon Panama.

The costs of tuberculosis are high for Panama. The Republic currently allocates approximately $1.0 million to the prevention, diagnosis, and treatment of the disease. The indirect costs from lost wages range from a minimal estimate of $440,000 to a more reasonable and still conservative estimate of $1.7 million annually. The indirect costs attributed to increased caloric needs of the ill population are expressed in terms of the food value as the number of persons it could feed if reallocated, the number of working days required for its production, or its market value. Using the market value of the food based upon the [illegible]imated minimum daily dietary cost in Panama City, the total excess food costs to the tuberculosis patients in 1968 is approximately $314,000. The indirect costs attributed to loss of potential earnings because of premature death from tuberculosis equal approximately $900,360, using the most conservative assumptions. The indirect costs attributed to investment by the society in the individual are not calculated here because sufficient data are not available. The transfer costs to the government through Social Security payments to those workers with tuberculosis range from a minimum cost of $360,696 to a moderate cost of over $3.0 million. These Social Security payments represent a transfer of money within the economy to those who are sick. These are not lost resources. Nevertheless, with so many unfulfilled needs they represent a serious misallocation of funds.

The costs of tuberculosis to Panama are approximately $1.0 million in direct costs and range from a minimum estimate of $1.7 million to a moderate estimate of $3.0 million in indirect costs. These figures exclude the costs to the Social Security system.

The costs of the enteric infections are calculated only for the indirect costs of lost wages and increased caloric needs. This amounts to $143,350 annually. The figures certainly understate the problem of enteric infections, especially their role in undernutrition with subsequent poor school and work performance. This acknowledges that while costing of a disease is a most useful tool in determining the problem presented by disease, it is not the only means of deciding where resources would be most productive. Because all the costs of enteric infections have not been calculated here, usually because the necessary information was not available, the costs of these diseases appear to be less than those of tuberculosis. In fact, both disease problems are placing an enormous economic burden upon Panama. Efforts to improve the conditions in which these diseases are fostered--crowded living conditions, unsafe water supplies, and inadequate food supplies--could significantly alter the costs of both problems.

The costs of malaria amount to $4.4 million for the direct costs of the eradication program and from $81,500 to $105,800 for the indirect costs of lost wages and increased caloric needs. Because the direct costs so drastically exceed the indirect costs calculated here, some may consider that the low indirect costs do not warrant such a high out-lay for prevention. It is because of this continued eradication program (begun in 1947), however, that the indirect costs are currently so low.

The presentation of the costs of the three disease problems points to the economic burden of disease for Panama. The method for costing does not mean that costs alone should determine the allocation of resources in any given area. The causative factors of these problems must be determined and altered where possible. Ignoring the problem of disease or treating it only superficially results not only in human suffering but also in a significant loss of economic resources.

NUTRITION

In Panama, the nutritional level of the population complicates the existing health problems, impedes the growth of a large portion of the children, and significantly alters the productivity of the work force. Roughly one person in six is malnourished due to inadequate diet; 60% of the children under age five exhibit protein-calorie malnutrition. Growth retardation is one to two years for the average Panamanian child of six years in regard to his height and weight.

There are numerous examples of the effectiveness of improved diets on work productivity. This is important for Panama where development goals include the construction of the final portion of the Pan-American Highway, a task which will require an efficient work force. As mentioned previously, the level of nutrition contributes to the severity of the existing problems of childhood diseases, the enteric infections, and the complications of pregnancy.

The causative factors in malnutrition include a food supply inadequate to meet the needs of the body and diseases which increase the metabolic processes (promoting excessive losses or malabsorption, resulting in secondary malnutrition). The latter is best corrected by prevention and treatment of the underlying disease process while simultaneously correcting the dietary deficiency. The former, primary malnutrition, occurs partly because total availability of nutritionally required foods is insufficient, as in Panama. Partly, however, this malnutrition is due to a number of socio-economic factors which hinder adequate distribution and consumption of food.

Although absolute agricultural production has risen in recent years in Panama, per capita production has shown no significant increase. In addition, the products that have been increased are used primarily for export and have not contributed to an improved level of nutrition. Food exports and imports do not work to the nutritional advantage of the population and in many cases are also to the economic detriment of the population. Panama suffers not only from shortages in total agricultural production but also from the underproduction of foods with the highest nutritional values. These problems are compounded by lack of transportation, lack of purchasing power, and poor understanding of proper nutrition.

At present, the development goals of the Panamanian Government and the international

agencies that assist and advise the government have not taken into account the nutritional needs of the population when setting agricultural and economic goals. There is no national food and agriculture policy. Current price supports are also based on similar agricultural goals that fail to reflect the nutritional needs. These goals could be redirected to allow a nutritional advantage and an economic advantage. For example, corn production could be partially converted to bean production with considerable economic gains. Beans are culturally acceptable and have a much higher protein content than corn. (Panama has shown in the past that agricultural goals can be met when set within reason.) The production of meat sources also offers a means of more efficient use for both the nutritional and the economic sectors.

The health status of the population is significantly affected by the agricultural practices. At the same time, the efficiency of the agricultural production could be increased if the workers were healthier. The two sectors--health and agriculture--are linked in such a fashion that improvements in either sector will work to the advantage of the other. The ultimate result will be a benefit to the population and to the economy.

PART TWO: IDENTIFICATION OF RESOURCES

OBSERVED HEALTH CARE RECEIPT

Receipt of health care is probably best determined through a mass survey and examination procedure. Since this is not possible here, various sets of data are used to estimate the extent and availability of medical care received by the population. Data on medical certification of deaths are used to demonstrate the availability of care at the time of illness. Certification of death is interpreted to mean that registry of death carried the signature of a physician who was in attendance at, or shortly before or after, the time of death.

The data show that 95.2% of all deaths in urban areas, but only 30.8% of deaths in rural areas, are medically certified. This means that 96% of all non-certified deaths occur in rural areas. Based on cause of death and medical certification, it is imputed that in the rural areas 20% of the dying population receive no death-related medical care, 50% may or may not have had some recent medical care, but probably none at death, and 30% probably receive some medical care at least at the time of death.

Since a significant segment of the population does not receive medical care at the time of death, a similar proportion may also not be receiving medical care when ill. Considering the data on medical care to the rural dying, similar conclusions are drawn regarding care to the rural ill. The estimated distribution of medical care in the rural areas is that 20% of the population receive regular preventive or therapeutic care.

The assumption that a range of 20 to 70% of the rural population receives little or no care is further supported by the data reported for three special categories of the population: pregnant women, infants under one year, and children age one to four years. National data from hospitalizations and medical consultations show that in 1965 only 40% of pregnant women, 75% of infants under one year, and 50% of children aged one to four years were seen. This means that from 25 to 60% of certain population groups did not receive even simple, routine care. Even if this care were evenly distributed through the urban and rural population, the rural areas still lack sufficient medical care when compared with the urban areas.

Further evidence of maldistribution or non-availability of professional care, especially in the rural areas, is evident in a review of professional attendance at the time of delivery. In 1968, approximately 61% of the total 53,000 births in the Republic were attended by professional medical personnel. Ninety-six percent of the 21,000 urban births had professional attendance. The assumption that professional attendance at the time of delivery might modify maternal and infant morbidity and mortality is partly supported by a review of infant death rates for urban and rural areas. In 1968, the reported infant death rate for urban areas was approximately 32 per thousand live births, whereas in the rural areas this was 46 per thousand live births. Since there is significant underreporting in the rural areas, it is believed that the infant death rate in these areas is probably much higher than reported figures indicate.

The above leads to the conclusion that the patterns of mortality could be significantly

altered in the rural areas, were medical care available. Lower mortality rates in the urban areas may reflect healthier living conditions in these areas, especially water and sanitation, easier access to available medical care by urban inhabitants, and other socio-economic factors. If simple health care systems were available to a larger percentage of the rural population, the rates of illness and death should be reducible to at least the level that now exists in the cities.

The availability of routine preventive services can be estimated by a review of the immunization data. Coverage is far short of the national goal of immunizing 80% of the susceptible population. At least one-third to one-half of the susceptible population is not receiving this basic preventive service. From the viewpoint of the providers of care, the susceptibility to disease far in excess of a theoretical minimum results in high morbidity and mortality and places an unnecessary and expensive burden on care facilities and resources already severely limited. The result is the inefficient use of these resources.

The adequacy of the current immunization programs is examined by calculating the percent coverage of the "young population increase." The "young population increase" is approximated by using the number of live births minus the deaths of children under one year of age. During the years 1965-1968 this increase ranged from 45,000 to 48,500 (approximately 3% of the total population). It is assumed here that each individual immunization confers life-long protection, that all immunization is going to the "young population increase," and that no person already immune is re-immunized. Employing the above assumptions and applying the reported number of immunizations for the years 1965-1968, it is calculated that the "young population increase" would enjoy virtually complete protection against smallpox, approximately 65% protection against tuberculosis, and 50% protection against diphtheria, pertussis, and tetanus. Considering that the assumptions used are not realistic appraisals of the distribution of immunization, and that with a tripling of the population within the next generation, the current rate of immunization does not nearly approach national needs.

The benefits of expanding the immunization programs, versus the costs of treating the disease that results without such protection, are great. Immunization programs can be designed to achieve optimal allocation of limited resources. Combined intensive use of the simpler therapeutic regimens and of preventive measures are logical in areas of high prevalence of a given disease. It is important to optimally combine immunization and simplified treatment to provide maximum protection at lowest cost.

HEALTH RESOURCES

The resources with which the health sector in Panama has to work are limited in several senses. A major problem is simply that there are not enough health personnel, facilities, or financial resources to provide extensive health services to the whole population. If the population doubles in the next twenty years as expected, this problem will become worse. The overall physician/population ratio does meet the WHO minimum standard of one doctor per 10,000 persons. However, almost all physicians in Panama divide their time among more than one job, particularly in urban areas. Usually, the physician has a private "clinic," works in one of the major hospitals or centers, and often teaches at the University of Panama Medical School. Accordingly, the physician's time is not effectively used. The nursing ratio of fully qualified nurses to practicing doctors is 1.3 to 1, less than the WHO minimum standard of two nurses for every physician. In a country with limited health resources and personnel, nurses could be more widely and economically used as primary sources of care. However, because of the relative shortage this is not really possible.

Another major problem is that those resources that do exist are excessively concentrated in the two major cities, especially in Panama City. Approximately 70% of all physicians are located in Panama City, which means that the city has more than double the national physician/population ratio. The distribution of nurses is essentially the same as that of physicians, with 70% located in the province of Panama, 5% in Colon, and surprisingly an additional 10% in Chiriqui. The major Social Security hospital, the psychiatric hospital, the University of Panama, Social Security clinics, and other large public and private hospitals are located in Panama City. Over half of the hospital beds in the country are in Panama City, with another concentration in Colon. Yet, while the physical facilities are relatively abundant in Panama City, the private physicians and facilities are undoubtedly too expensive for the poor.

Data on hospital beds show that private hospitals are filled only to half of their capacities, while government hospitals are two-thirds filled, and bed occupancy of the specialized hospitals exceeds 100%.

The sectorialization plan which is now in effect by the Ministry of Health is helping to reach large numbers of urban residents who previously had limited access to health care. Under this plan, urban care needs are being met by moving from hospital-based to center-based medical care.

Health facilities in the rural areas are few, consisting primarily of Integrated Medical Centers. It appears that those working in the Integrated Medical Centers in the rural areas are medical interns fulfilling their required service of one year in the interior of the country. If this is the case, then rural patients may be receiving care which lacks continuity from year to year.

It was observed that in the rural areas, where there is great need, the utilization of services is extremely low. It appears that there is little outreach by the physician and other health personnel; therefore, the population seeks and demands care only for certain conditions. Integrated health centers could provide more care within the present resources through a reorientation of attitudes and an expansion of health education.

The government has recognized the lack of resources in rural areas and has begun programs to remedy the situation. It has also shown its concern for community response to the health care situation. However, it must be remembered that much of the projected population increase is expected in the cities, with increased needs for health resources. Provision of health services to the rural areas at the expense of the cities, particularly the urban poor, will not be a solution.

In the light of current health training opportunities, the relative shortage and maldistribution of health personnel will continue. Although the University of Panama Medical School (the only medical school in the country) has an enrollment rate above average for Latin America, several major problems persist. Rigid organizational patterns limit communications and prevent the development of an evolving, integrated curriculum. There is a shortage of teaching staff, with over 80% of the faculty working less than half-time. A large number of the medical students are inadequately prepared by their previous educational experiences; many must repeat courses causing an increased cost of education, overloading of facilities, prolongation of the period of medical education, and fewer graduates per year. There is a major shortage of modern medical textbooks for the student body. In addition, the cost of medical education is very high in Panama compared with other Latin American schools. Panama is, however, in a distinctly better position than many of the countries of Latin America as far as physician training and manpower.

Other health professional training facilities in the country include the nursing school in the Hospital San Tomas, which is affiliated with the University of Panama, and which recently formed schools of dentistry and pharmacy. Sanitary engineers are trained by the Engineering Faculty, and programs are also available to train laboratory technicians and sanitary inspectors. In general, however, training in paramedical and auxiliary fields has been insufficient and of low quality.

Little is known regarding the other factors that relate to the health resources in Panama, specifically health supplies and health legislation. There is a self-supporting government agency responsible for the safety of pharmaceuticals, and in addition, the government spends $12,000 on drug control. The total expenditure amounts to $7.7 for drug control per $1,000 of drugs consumed. This is the highest in the Americas and seemingly reflects a relatively high level of drug control.

The health legislation in Panama is in the form of sanitary codes which are usually supplemented by other laws regulating specific health problems. The regulations set general sanitary standards for the production, processing, handling, and sale of foods. Environmental sanitation regulations cover water supplies and sewerage systems but not industrial hygiene or urban housing. In general, there is control of the activities of the most highly trained medical personnel, but not of the various categories of medical assistants and auxiliaries. The current status regarding enforcement of these regulations is not known.

The health resources as currently allocated, and as projected for the future, cannot provide adequate care to the population of Panama. The problem of limited resources will continue as long as the major demands for services come for the treatment of acute illnesses, many of which are preventable by comprehensive immunization programs and improvements in environmental hygiene. The health care system in Panama now is overburdened with treating disease, rather than preventing disease and maintaining health.

However, recent emphasis placed upon preventive care through the health centers by the Ministry of Health is a strong move to meet these needs. In this "sectorialization" concept, as advanced by the Ministry, health care is provided near the residence of the patient, in a health center. A patient is referred to the hospital only if he cannot be cared for in the center on an outpatient basis. If possible, he is treated in the hospital by the same physician. Presumably, this system will remove some of the geographic barriers to care provide continuity of care, emphasize prevention, and substitute low cost facilities for the more expensive hospitals. This system makes use of community "health committees" which exert considerable policy and fiscal control over the health centers. The growth of the health center system is also becoming an effective mechanism for community development.

HEALTH CARE ADMINISTRATION

Health care in Panama is delivered through a variety of sources: the Ministry of Health, autonomous government agencies, private sources, voluntary agencies, international organizations and agencies of other governments, plus the unknown sources of non-professional groups.

In January 1969, the Ministry of Labor, Social Welfare and Public Health was divided into a Ministry of Health and a Ministry of Labor and Social Welfare. The Ministry of Health is responsible for the promotion and protection of the health of the country through the formulation of national health plans, the implementation of programs, and the provision of health care services. The technical services division of the Ministry is responsible for the activities of categorical disease programs, maternal and child health services, adult medical care services, epidemiology and general technical services such as nutrition, food and drug control, laboratories, and health education. In addition, the Ministry controls the 32 government-run hospitals, 38 health centers, 109 sub-centers of health, and four mobile health units. It is also responsible for the supervision of the physicians working in the government service.

The Ministry has under its control several technical advisory bodies, including a National Health Planning Commission. The Ministry also maintains relationships with autonomous agencies, especially the Social Security Agency and the National Water and Sewerage Authority (IDAAN). The Social Security Agency provides a significant amount of health care through the Hospital General and the several polyclinics which it operates. It also provides financial benefits for old age, invalidity, death, sickness, maternity, and work injuries. IDAAN is the agency that is responsible for the building and maintenance of water and sewerage systems in the Republic. Because these services are health related, all funds of IDAAN are listed as health sector expenditures in the national budget. This inflates actual health sector expenditures somewhat, as it has been estimated that 50% of water supply and 20% of sewerage system expenditures are not directly linked to the health status of the population.

A large portion of health care is delivered through private physicians and private hospitals. This care is not organized or administered through any one system.

Because health care is delivered through several mechanisms, it is difficult to determine the total amount spent for care. No data are available regarding the expenditures for medical care from private sources. In a recent study from the Ministry of Health, it was estimated that the total government expenditures for health care in 1968 were $45.9 million, almost three times the government expenditures for health care in 1960. The increase is primarily a result of the increased expenditures of the Social Security Fund and IDAAN, not the Ministry of Health. The Ministry feels, however, that the present government recognizes health as an integral part of socio-economic development, and has, therefore, increased the Ministry of Health budget for 1969. In 1969, the Ministry of Health budget rose to $18.2 million which was 13.4% of the total government budget. This was an absolute increase over the $15.7

million budget of the previous year, and a relative increase of the Ministry of Health portion of the total budget which was 12.0% in 1968.

Increased expenditures on health in recent years may not have produced dramatic improvements in the health conditions of the population in general. The population has grown at a rate of 3.3% annually, thus the tripling of health expenditures over the years 1960 to 1968, expressed in per capita terms, only amounts to a doubling of expenditures. While the Ministry of Health budget portion of the total government budget increased 1.4% from 1968 to 1969, the population increased 3.3%. For the government's expenditures on health to have the desired effect upon the health conditions of the population, the growing size of the population must be considered.

Additional funds for health care are provided through the municipalities, voluntary help from citizens in their communities, programs financed through the National Health Planning Commission, and external financial and technical assistance provided by the international organizations.

Panama receives development assistance from a variety of sources including PAHO/WHO, USAID, the Inter-American Development Bank, and several private organizations and voluntary agencies. The emphasis of these assistance programs is upon the problems of population, malnutrition, rural health services, organization of health services, water supply and sewerage systems, health planning, tuberculosis, malaria, and yellow fever. These are areas of major importance to the health development of the country. A large amount of external assistance goes to projects in sectors other than health. These projects generally ignore the impact of health conditions on the non-health sectors, although the health of the population could dramatically affect the success of many such projects. The completion of the Pan-American Highway or the development of tourism are examples.

Over the years 1946 to 1967, the United States alone extended financial aid to Panama amounting to $205.9 million. During the same period, the international organizations contributed $51.8 million. For funds such as these to be most effective in the total development of the country, all sectors, including health, must be considered to allow the wisest allocation of the funds. Furthermore, effective allocation of these funds must reflect considerations of the basic problems within the various sectors.

HEALTH PLANNING

For many years Panama has made a conscious effort to set development goals and to meet the expectations of these goals. The Republic has participated in international planning activities through the 1961 Charter of Punta del Este, and more recently, the PAHO Center for Health Planning. The Charter represented a commitment to accelerate economic and social development. The training offered through the PAHO Center for Health Planning provides high-level government officials with the planning methodology for analyzing problems, establishing norms for health care, and allocating resources for the health sector. Using these and other techniques, the government has identified the major areas of concern and has developed plans to alleviate some of the health problems. Those problems areas identified by the Ministry of Health and their plans for solutions are quite similar to the findings of this study.

The Falk Survey: Health in Panama

In 1957 a report by Dr. Ira Falk, "Health in Panama: A Survey and a Program," was prepared in conjunction with economic studies conducted by the Republic of Panama and the International Bank for Reconstruction and Development. The health survey was a major undertaking, providing a brief background of the disease problems of the Republic and a major review of the resources, facilities, and personnel, with particular attention to administrative relationships within the health care system. Major recommendations of the Falk study directed toward the following: health services for both the rural and urban populations with improved efficiency and emphasis on prevention of disease, water supplies and sanitation services, malaria eradication, anti-tuberculosis activities, communicable disease control, urban housing, rural health centers, and reorganization of the health care system with emphasis on administrative reform and health planning.

Many of the proposed recommendations were implemented. This early history of health planning and specific action has encouraged continued endeavors in planning.

National Health Plan for 1962-1970

In April, 1963, the General Planning Administration in the Office of the President prepared a National Health Plan for the years 1962 to 1970. The plan evaluated the basic health problems and defined priorities and objectives for future health action.

From the consideration of the health sector problems, items of highest priority are given. The diseases of highest priority include gastroenteritis and acute childhood diseases, complications of pregnancy and delivery, nutritional deficiencies, tuberculosis, malaria, and accidents and traumas. The services of the health sector that the plan defines as requiring most immediate attention are the water supply systems, rural health services, and rural housing. The highest priority items in the areas of organization and administration include increased personnel, financial and institutional resources, and improved technical and administrative organization. Having evaluated the major problems and stated the problems of highest priority, the plan defines goals for achievement in these areas.

The work accomplished by this plan is a major step toward improvement of the health conditions in the country. The problems have been identified, but the listing of priorities does not provide ranking or relative weighting. No decision-making criteria for resource allocations or relative payoffs of activities are identified. Because the plan includes almost all of the health activities and problems, it is difficult to establish criteria for the appropriateness of any given health program for the needs of the collective population.

With the National Health Plan, as with this study of Panama, the next step is to determine the specific program areas where application of the available resources would have the greatest impact. In making such determinations, the planner applies conscious decision-making to the solution of the problems.

National Development Strategy for Panama

In addition to health sector planning, the government of Panama has developed plans for the broad economic sector. In September, 1969, a development strategy for Panama was prepared by the Office of Planning and Administration, Division of the Office of the President. The plan is entitled The Nature of the Panamanian Economy and a Summary of the Strategy for National Development for the Next Decade. The plan proposes a strategy for economic development through nine major areas of concern. In addition, other factors that contribute to total development on the national and regional levels are considered. Factors of social concern are also included.

It is commendable that the Republic has defined major areas for economic development. Since health can ba a major contributor to the success or failure of economic development, health and disease have been considered in light of this effect on other proposed sectors for development.

The nine major areas of concern for economic development include: expansion of the Colon Free Zone, increased tourism and cargo capacity through the international airport at Tocumen, expansion of tourist trade, creation of an international banking center, exploitation of land adjacent to the Canal Zone, commerical exploitation of recently discovered valuable minerals, development of the shrimp and fish meal industries, increased development of the beef exporting industry, and expanded foreign investment in industry near the Canal Zone. For none of these does the means for obtaining the goals include health considerations. The action taken by the country to encourage tourism includes hotel expansion and public relations. It has been shown in many parts of the world that a tourist industry is not possible in the absence of potable water supplies, safe sewerage systems, available transporation systems, and protection from communicable diseases. The strategy plan for Panama does not consider these factors as they relate to tourism. Similarly, the plans for developing beef for export do not make provisions to prevent the reintroduction of foot-and-mouth disease when the Pan-American Highway is completed through Darien. However, this concern has received considerable attention

recently. Other goals, particularly those relating to agricultural and trade policies, do not consider the nutritional implications of the proposed policies.

The plan also alludes to the integration of health, education, agrarian reform, community development, employment, job training, Social Security, cooperatives, and housing. At this point in the plan, the expansion of health facilities in the rural areas is mentioned, with emphasis on nutrition, preventive services, and the provision of water and sewerage systems to the whole country.

Although the health sector is mentioned then, perhaps this sector could have a more effective role if identified in the plans for achieving specific economic goals. This is not meant to imply that health should be the item of highest priority; rather, health should be an integral part of any plan for economic development.

The significance of this is that for a country to ignore the problems with which it is faced may only increase these problems, often to a point where solutions become virtually impossible. For this reason, we have calculated the costs (which are not usually obvious) of disease in order to demonstrate the actual impact of disease on the society. The emphasis in this analysis is not so much on the specific diseases discussed, but rather on the method used for determining the costs. Applying this method, it is possible to realize the negative impact of situation improved.

The study is divided into two main sections. The first part defines the health status and disease problems and includes the calculation of the costs of these problems to the society The second part summarizes the resources and mechanisms used by the society to solve its health problems. This part also examines health planning in Panama and the relationship of health to total country development plans. Where possible, future trends and their impacts on the health status of the population and the development of the society have been projected.

Two appendices have been added. The first presents detailed data in graphs and tables referenced in the text. The second provides a collection of background working documents.

Although a work of this nature cannot be all-inclusive, we feel that the conceptualizations that were made from the available information have led to useful interpretations of the health situation in Panama. This work is never completed; the problems defined here and the solutions proposed are not meant to be final answers to the questions of the definition of the health status of the population and the means for its improvement. Rather, we have sought to demonstrate different ways of looking at the health of a population and the relationship of health to socio-economic conditions. We have identified conditions both within the health sector and within traditionally non-health sectors that influence the health status of the population.

In general, and especially with the non-health sectors, we have included illustrative examples which are presented not as definitive solutions for a plan of action, but rather as framework for speculation.

ADEQUACY OF HEALTH RESOURCES

The health resources that are available in Panama have been identified from the perspective of both the receivers and deliverers of health care. The adequacy of these resources is determined in light of the following:

I. Incidence, prevalence, duration, and severity of disease to be treated;

II. The extent of preventive services;

III. The quality and efficiency of professional practice;

IV. The socio-economic and cultural factors that limit the quality of care received;

V. The accessibility of available health services as modified by geographic and economic factors;

VI. The level of health education, awareness, and expectations;

Based upon the information gathered, as presented in this report, the judgment is made that health resources of Panama are inadequate. In an absolute sense, health resources will probably always be considered inadequate. In a relative sense, however, the inadequacy of the resources can be altered by improving the environment in which the resources are applied, i.e., the optimal allocation of resources within the health sector, and the optimalization of interactions among sectors.

The six factors listed above are elements of the environment that most directly determine the use of resources. Currently, in Panama, these elements play a negative role in the allocation of the health resources. The inadequate time of the health personnel and the inadequate funds of the health sector are primarily spent treating diseases for which simple preventive techniques are known. Training for many of the health professionals is insufficient and frequently inappropriate to the problems encountered, and the quality of practice may be inconsistent. For a large part of the population, health care facilities are simply not accessible, usually for geographic, socio-economic, or cultural reasons. Finally, even rudimentary knowledge of the causes of disease, of the importance of personal and environmental hygiene, and of basic nutritional needs for health is generally lacking.

In summary, the insufficient health resources available are not utilized most effectively for the protection and promotion of health and the treatment of disease. Working within the constraints of these resources, it could be possible to deal with the problems identified throughout this report. If the basic elements that impose the greatest burden upon the health resources were altered, it would be possible to develop a more favorable health status of the population.

To a major extent, the current effort of the Ministry of Health is reorienting health care to be center-based rather than hospital-based, with emphasis on community participation, outreach services, and continuity of care; increasing emphasis in preventive services seek to meet the problems outlined above. The success of the efforts may mean a measurable improvement in the health of the population as well as a potent mechanism for community development.

CONCLUSIONS

The definition of the health problems of Panama and the identification of the health resources applied to these problems use available, reported data and apply certain assumptions. From the information that has been developed, conclusions have been drawn regarding the basic health problems of Panama. These basic problems relate to three causative factors and are further influenced by two modifying factors. The three causative factors are the following:

a. The maldistribution and poor,inappropriate utilization of basic health services;

b. The problems of food use and consumption;

c. The inadequacy of basic environmental sanitation;

a. Basic health services in Panama are distributed in such a way as to make health care available to the urban population, but much less available to the rural population. To some extent, the rural population may inappropriately utilize the care that is offered. Nevertheless, the maldistribution of health services and the inadequate volume of these services are manifested by the large number of deaths and high morbidity caused by preventable diseases, the inadequate coverage of the population by immunization, the absence of professional attendance at times of delivery (especially in rural areas), and the high infant mortality. Since Panama has, in general, decided to solve the problems of communicable disease control by the provision of basic services through a network of local health centers (rather than by conducting a large number of mass campaigns), it is necessary to provide a sufficient volume of services and appropriate distribution to meet the basic needs. Furthermore, it is necessary to sponsor a vigorous outreach service to promote effective and efficient utilization of the available services.

b. The problems related to food use and consumption are manifested by malnutrition in a majority of pre-school children and also in approximately one person in six of the general population. The malnutrition is seen in protein-calorie deficits resulting in retarded growth and development, in a high prevalence of endemic goitre due to iodine deficiency, and in a high prevalence of vitamin A deficiency. The results of malnutrition magnify the inadequacies of the health care system by increasing the burden of diseases that require treatment and by producing diseases of greater severity. Specifically, the high morbidity and mortality from childhood diseases correlate closely with malnutrition and consume large volumes of care. In addition, the relationship of malnutrition to enteric infections is a vicious cycle. The enteric infections themselves cause and intensify the malnourished state by means of malabsorption, altered food consumption, fluid losses, and increased metabolism. It has also been demonstrated that in malnourished populations, children especially suffer a far higher incidence of enteric infections, presumably because of lowered resistance. The addition of parasitic infections further burdens the already debilitated state of the population. The end result of this is manifested in excessive childhood disease and death, poor growth and development, and ultimately the decreased intellectual and physical productivity of the population.

c. The problems related to environmental sanitation have been alluded to above--enteric infections carried by contaminated water and food, and intestinal parasitism, partly as a result of inadequate sewerage disposal and inadequate agricultural and industrial water control. The high morbidity and mortality resulting from these infections have been cited. In addition, these infections are more serious because of the poor health care services.

The three major problems--distribution and utilization of health care services, food use and consumption, and environmental sanitation--form an interacting network of cause and result. Each problem in many ways complicated or contributes to the development of the other problems, and each problem is a result or manifestation of the other problems. Consequently, solution of the problems to meet the basic health needs of the population depends upon the breaking of the interacting links by means of working simultaneously upon these basic problems rather than working in a disjointed way upon specific manifestations of these basic health problems.

The modifying factors are:

a. population change

b. health education

a. The population change is manifested in rapid growth such that conservative projections estimate that the population will almost triple by the year 2000. In addition, there has been a rapid flow of the population into the major urban areas. It is in these urban areas that approximately 80 percent of the country's revenues are produced and distributed, while only 50 percent of national population lives there. The rural areas receive only 20 percent of the revenues for their half of the population. As a result of this distribution of revenues and the services generated thereby, there has been a steady shift of the population to the urban areas. The result has been growth of urban areas with rising unemployment and demand for services that are becoming overburdened and obsolete. The two trends of population growth and population shift are not seen as problems in an of themselves, but rather for the burden they place upon the society. It has been shown that the distribution of services does not keep pace with the current demands and is certainly not equal to the task of the projected population changes unless a dramatic growth process of the services is instituted. The same has been demonstrated for food production and environmental services.

b. The other modifying factor is health education. The levels of simple knowledge of basic hygiene, basic nutrition, and child growth and development significantly alter the demand for and consumption of health care services. In many ways, the health status of an individual is dependent upon the results of many individual decisions and actions.

Insofar as these decisions can be influenced favorably by basic health information and positive experience with health care situations, better utilization of available services will result and a healthier life for the individual can be anticipated.

Finally, it should be emphasized that many other sectors of the economy have a bearing upon the ultimate status of the health of the population. It has been suggested that the goals of the agricultural sector should reflect the basic human needs for adequate nutrition. When the agricultural goals do not reflect or exceed these needs, much waste of resources occurs, and human suffering from malnutrition can result. Goals of the transportation and trade sectors may reflect essentially economic goals of development without awareness of the health implications of these decisions. Plans to complete the Pan-American Highway through the Darien Gap should use the available information and include consideration of malaria and tuberculosis control for this high prevalence area; adequate nutrition for the highway construction workers; and animal transport control to protect against the importation of foot-and-mouth disease (present in Colombia and much of South America), brucellosis and bovine tuberculosis, and the animal encephaliti s prevalent throughout Central America. Foreign trade goals proposed by CIAP to increase exportation of livestock should recognize the impact this exportation will have upon the nutritional status of the population and estimate the value of revenue earned as compared with the losses incurred by the prevalent malnutrition. A schematic presentation of the interrelationships between various sectors and their effect upon the health status of a population has been prepared by the PAHO Center for Health Planning. (Illustration 1)

The impact of health on all sectors of the Panamanian economy has been shown throughout the report. Health cannot be considered in an isolated situation, solely as an end in itself. The health level of a population is a major factor in determining the economic growth and realizing the human potential of that population. At the same time, all other sectors of the economy relate to the eventual level of health and the quality of life in the country. If it is the aim of any domestic or foreign agency to contribute to the total growth of the Panamanian economy, then the implications of the health problems at present require serious consideration.

GENERAL CHARACTERISTICS

The Republic of Panama is situated on a narrow isthmus which connects Colombia, South America, and Costa Rica, Central America. On the north, the Republic is bounded by the Caribbean Sea and on the south by the Pacific Ocean. The Panama Canal bisects the country. The total land area is 28,575 square miles, approximately the size of West Virginia.

Panama's population, estimated 1.4 million in 1970, is among the smallest in Latin America. However, the population is growing at a rate of 3.3% per year, higher than the average for Latin America, the fastest growing region in the world.

Compared to other Latin American countries, Panama is relatively high on a scale of economic and social development as measured by such simple indices as $624 per capita GNP, 78% literacy rate, and a 1/1800 physician/population ratio. Average statistics for the country, however, hide the great difference between the urban and rural areas, and the difference among economic classes.

The urban population has risen from 41.5% of the total population in 1960 to an estimated 50% in 1970 and is expected to be 59% of the total by 1980. However, the census defines as "urban" any settlement of 1,500 people or more with certain facilities (electricity, school, water supply, etc.). Of the 21 urban settlements in 1960, only 5 had populations of 10,000 or over; the smaller urban areas have the traditional rural cultural pattern. One-third of the total population is located in the two large cities on either end of the Panama Canal, Colon and Panama City. Panama City, the capital of the Republic, alone contains over one-fourth of the country's population and has been growing at a rate well above the national average.

Eighty percent of Panama's Gross Domestic Product is generated in the cities. The largest number of urban workers are in service occupations. Industry, commerce, and construction activities have all expanded greatly in recent years. Panama has always been an important

commerical center and increasing emphasis is being given to commercial expansion. Wages are higher in the cities than in the rural areas. Unemployment has been a relatively low and stable 6-7% annually, and inflation has not been a major problem. In short, the cities offer opportunity to immigrants from the rural areas.

On the other hand, urban living conditions are poor for the large bulk of the population. A small upper class and a growing middle class live in the relative luxury. Housing for the poor consists either of wooden tenements or of the casas brujas shacks constructed literally overnight by those who cannot afford to rent the tenements. Potable water supplies are available to most of the urban population. A lesser but still high percentage of the residents have some available means of waste disposal. A significant amount of development assistance has been allocated to expansion and improvement of urban housing and water and sewerage systems to meet the demands created by increasing urbanization.

Despite this urbanization and modernization, agriculture is still Panama's single largest occupation. Bananas, the country's chief export, are grown in Chiriqui province by a subsidiary of the United Fruit Company. Other large-scale agricultural operations are, however, rare. Most of the farming is done on individual farms by traditional methods on poor agricultural land. Facilities such as health centers and schools are distributed more sparsely in the rural areas than in the cities.

Rural housing may offer some protection against weather and animals but very little in the way of a sanitary environment. In 1967, potable water supplies were available to only one-third of the rural areas, and water piped directly to homes accounted for only a small percentage of that total. The problem of unsafe water supply is compounded by the general lack of sewerage and disposal facilities.

In short, there is a great difference between the large cities, immersed in the problems of modernization, and the rural areas, not totally untouched by modernization but largely continuing in traditional patterns.

Panama has been an independent republic since 1903. For the past few years the national government has been led by General Omar Torrijos.

A recurring problem in Panama-United States relations is the sovereignty over the Panama Canal and Canal Zone, currently owned and operated by the United States. Both economic and social factors relating to the Canal have been sources of conflict. The Canal and the Zone have been of primary importance in developing Panama's economy, particularly the commercial and industrial sectors. Although an estimated 5% of the Panamanian labor force worked in the Zone while living in the Republic, revenue relating to goods and services provided to the Zone account for approximately 20% of the Gross National Product.

The national government has given a high priority in education; approximately 25% of the national budget has been spent on education in recent years. Education is free and compulsory for all children between the ages of 7 and 15. A very high percentage of Panamanian children enter primary school, but the dropout rate continues to be high in secondary, normal, and vocational schools. Only a small percentage of students proceed to higher education.

Panama has had considerable experience with concepts of public health. The problems of overcoming disease during construction of the Canal are well-known. Today, Panama is faced not only with the communicable diseases common to less developed countries, but also with the diseases associated with modernization and the developed countries.

Panama has made a national commitment to accelerate economic and social development as manifested in major improvements in health, education, housing, and economic reform. This commitment was demonstrated in the participation by the Republic in the Charter of Punta del Este. The Charter set forth specific goals for the decade 1961-70 which included:

1. Economic growth of 2.5% per capita annually with the benefits of economic progress to reach all citizens.

2. Elimination of adult illiteracy and access to six years of primary schooling for all children by 1970.

3. Increase in life expectancy at birth by five years by means of a 50% reduction in infant and early childhood mortality, by provision of safe water supplies and sewerage systems to 70% of urban and 50% of the rural population, by eradication of diseases for which techniques of eradication are known (especially malaria), and by improvement in nutrition.

Progress has been made in all sectors--economy, education, and health. In the light of past improvements and the goal of continuing progress, this report is written to identify the impact of health in its broadest sense on the future progress of Panama.

There has been little attempt to chart the progress of the past decade; rather, the present has been used as a starting point from which to project possible future developments.

PART ONE

DEFINITION OF THE PROBLEM

LIVING CONDITIONS

The living conditions of the people of Panama include all of the physical surroundings in which the individual finds himself on a frequent basis. This description deals with the conditions of the place of residence, and the occupational, educational, and recreational facilities with which one normally comes in contact. The primary concern of this study is to relate the health status of the people to the conditions in which they live.

Water Systems and Waste Disposal

The most important factor of the physical environment that affects the health of the people of Panama is the availability of water supplies and disposal systems. Water supply is generally seen as a necessity for economic development, particularly in the urban areas, and as a vital health factor in both urban and rural areas. There are numerous examples that demonstrate the extent to which water-borne disease can be reduced by supplying safe piped water to areas where drinking water has formerly been obtained from unsafe sources. In Japan, a survey in 30 rural areas revealed that after installation of safe water supplies the number of cases of communicable intestinal diseases was reduced by 71.5% and that of trachoma by 64%, while the death rate for infants and young children fell by 51.7%. In Uttar Pradesh, India, after water-works sanitation, the cholera death rate decreased by 74.1%, the typhoid fever death rate by 63.3%, the dysentery death rate by 23.1%, and the diarrheal disease death rate by 42.7%. Similar experience in reduction of intestinal disease rates following water supply development has been observed in Latin America, notably Cuba, Peru, and Colombia. It is reasonable to assume that the enteric disease rate in children could be reduced by 25 to 50% in Panama if safe water supplies were available.

Diseases attributable to unsafe water supplies contribute significantly to the mortality and morbidity status of the Panamanian population. Water-borne disease is the leading cause of death in children under 5, constituting approximately 10-15% of deaths in this age group. It is also a major source of morbidity and mortality in older children and young adults. Reported cases of all forms of dysentery for 1956 numbered 948. (Table 1)

This figure is particularly significant in that it refers only to those cases that were severe enough to cause those with the disease to seek and find medical care and to warrant the reporting of the cases by the medical personnel in attendance. The total number of persons who may have suffered from some form of the disease and were prevented from performing jobs, attending school, or caring for the home is unknown, but is believed to be high. The costs to the society and the individual for dysentery are described in another section of the study. The provision of safe water supplies could be a tremendous factor in reducing these costs.

The problems resulting from malnutrition, particularly among the young, correlate with the lack of safe water supplies. Safe water is essential to life. However, unsafe water serves as a vehicle for the transmission of disease-causing organisms. A discussion of the state of nutrition in Panama appears in another section. The problems of secondary malnutrition could be reduced if clean water and sanitary means of excreta disposal were available to the population. If the load of parasitic infections and enteric infections could be reduced, the nutritional state of the population could be remarkably improved by simple dietary manipulation. This is not possible so long as these infections persist.

The Ministry of Health in its 1969 analysis regards the situation of unsafe and inadequate water distribution and sewerage systems as one of the major health problems. The distribution of water and sewerage facilities is shown in Illustrations 2 and 3, and the figures are summarized in Table 2.

Water availability can be seen from Illustration 2 and Table 2. Potable water supplies are available to a large portion of the urban population (urban here is defined as a community with more than 1500 inhabitants). The goal of the Charter of Punta del Este is to provide access to potable water supplies to 70% of the urban population. In Panama, this goal has been surpassed. Various sources give different figures regarding water supplies in the urban areas; those used here are from the Ministry of Health for 1967. In that year 100% of the urban population had access to potable water supplies; 84% of the urban population had service to their homes.

This means that although theoretically all those living in urban areas could benefit from potable water supplies, 16% of the urban population had to gain access to the supply from some source outside of the home. The future presents several problems. Most of the water supplied to the main cities of Panama and Colon is treated in the Canal Zone, although the source of water is in the Republic. In 1965, the Canal Zone officials announced that the facilities would only be able to supply the city of Panama with up to 30,000,000 gallons a day, the estimated consumption for 1970 by the city. Studies are underway for the provision of a city supply system that will supply the needs until the year 2020.

Another major problem for the cities of Panama and Colon is urban migration. The cities are being expanded rapidly by people from rural areas with no special skills and very little money. Because they erect their houses literally overnight, there is no possible facility for providing safe water supply. Unfortunately, the problem is growing. In 1960, approximately 40% of the population of Panama were classified as urban. By 1970, almost 50% were urban.

Rural water supplies are still quite incomplete in Panama. The goal of the Charter of Punta del Este is to provide clean water supplies to 50% of the rural population by the end of the decade.

In 1967, only 33% of the rural Panamanian population had a potable water supply available to them, and 75% of this supply was in the form of communal wells. The remaining 25% of those with potable water supplies available in the community had piped water, but less than one-third of these had the water piped into their homes. Although these water systems are available, there is no information about water quality surveillance. Furthermore, rural water supplies are frequently unreliable in quantity during the dry seasons.

Water supplies currently under construction are shown in Illustration 2. The provision of these supplies is the responsibility of IDAAN (National Water and Sewerage Authority). Although IDAAN operates as an autonomous government agency, its expenditures are included in the total health, not the public works, expenditures for the Republic. It receives no funds from the central government and is largely supported by the IDB, AID, and PAHO, as well as the fees it collects for services. The primary functions of IDAAN include the efficient operation of the 58 water systems. Work on the water supplies has extended to many parts of the country. Although wells are still the main source of clean water for most of the rural areas, plans for the future include the expansion of the aqueduct systems to these areas. A summary of other projects is found in the inventory of external assistance programs.

Sewerage Facilities

Waste disposal facilities in Panama are extremely poor. The problems of unsafe water supplies are multiplied because proper sewerage is also not available. In 1967 there were 12 sewerage systems for the whole country, serving 29% of the total population. This represents 64% of the urban and 36% of the rural population. (Table 2) Illustration 3 shows the geographic distribution of these systems. Most of those were in the urban areas; of the urban population of 608,300, 88% had some means of waste disposal available to them. Of this 88%, 73% (or 64% of the total urban population) had sewerage service to their homes, and the remaining 27% had septic tanks or latrines. Although sewerage systems exist, there is little processing, and raw sewerage is pumped into the coastal waters. Because of the nature of the geography and tides, cleansing of these coastal waters around the cities is extremely slow.

The rural situation is worse. Of the total rural population in 1967, only 36% had some means of waste disposal available to them, and 99% of these were in the form of latrines and septic tanks. Only 1% of rural services were home connections.

The future does not look very promising for the improvement of these services for quite some time. Since 1960, all waste disposal projects have been in the urban areas. The sewers of Colon were built in 1908 and are currently undergoing a necessary reconstruction. The improvement of these facilities should be one of the highest priority items for the health sector. Good water and sewerage systems are essential to urban economic growth and investments, tourism, and the decline of the large number of cases of water-borne disease.

There is no information available regarding solid waste disposal, except in Panama City, where open dumping and burning is practiced.

Housing

Rural housing generally consists of ranchos or quinchas. A rancho is the typical residence of the more marginal and migratory subsistence farmers. It is made of cane walls, a thatch roof, and a packed dirt floor. The quincha is made of wattle and daub, a thatch or tile roof, and a packed dirt floor. It is a more permanent structure and is usually found in more prosperous neighborhoods. Structures of concrete or concrete block are usually found only in the towns, because of the problems of transportation and the high cost of the building materials.

Sometimes, the residence may be divided into more than one room. Areas for working and cooking are found in separate structures near the main residence. Latrines, where they exist, are located in the yard near the residence. The furnishings are generally meager and handmade. Beds are of canvas or straw matting; sleeping on the floor is not common. Lighting is inadequate, usually by kerosene lamp; domestic electricity in the rural area is generally not available. As mentioned above, water and sewerage facilities are inadequate.

There are several health hazards that may exist as a result of the type of rural housing described above. The lack of sanitary facilities presents many problems. In rural homes with latrines and cooking facilities near each other, seepage may occur and affect the water supply used for cooking and other purposes; flies and other disease-carrying insects that surround latrine facilities also have access to the food. Insects may also breed in areas near the home where puddles are formed from the heavy rains. In the dry season, the kerosene lamps may present fire hazards, particularly with the thatched roofs. It is difficult to know to what extent poisonous animals are a problem in the rural areas. The homes do not afford any barrier to the entry of animals, although yards are generally kept free of most vegetation to avoid the insects, snakes, and other common pests.

The lower class urbanite lives in crowded, unsanitary tenements or the casas brujas. The tenements are generally constructed of wood with common balconies running the length of each floor, have communal shower and toilet facilities located in the dark corner of the tenement, and are crowded to the point that cooking and other activities overflow onto the balconies which are shielded by a sheet of galvanized steel. The crowding in many areas far exceeds what is considered desirable. In the mid-1950's, the slum district of Chorrillo in Panama City had a population of 27,375 people, living in 556 houses--an average of 49.2 per dwelling. Other sections of Panama City are reported to be almost as crowded. Likewise, Colon has major slum areas. The correlation of this condition to disease is significant. Tuberculosis, which thrives in crowded conditions, is one of the ten leading causes of death and burdens the society with a tremendous cost annually.

Aedes aegypti were discovered in the slums of Colon in March, 1969. Eradication had been achieved by a campaign in 1949-50 (throughout the Republic and the Canal Zone). (The mosquito was imported by small boats operating the Caribbean and re-established itself in the slums of Colon.) This reinfestation was wiped out when the Ministry of Health and Canal Zone officials eliminated the breeding places of the mosquito. Aedes transmits yellow fever, dengue, Venezuelan equine encephalitis, and filariasis. An occurrence of these diseases would pose serious economic problems for Panama in terms of health and quarantine, and would severely affect trade and tourism.

The conditions of the other form of housing for the urban poor, the casas brujas (witch houses), are equally inadequate. These houses are so called because they appear overnight. They are less solid than the rural houses as they are constructed of whatever can be found at the time--sheet tin, cane, twigs. The casas brujas are inhabited by those who cannot afford to rent even the tenements. There are no figures available for the number of people living in the casas brujas, but it can be assumed that as urban immigration continues, the conditions will become worse. The impact of any disease on this population is devasting, as they obviously have no extra resources on which to rely in time of illness.

The middle and upper class of the urban areas have high standards of living compared with any other segments of the population. The upper class standard is quite luxurious, with easy access to the medical care that is concentrated in the urban areas. The middle class (in an attempt to attain status) probably deny themselves many items in order to have such access-

ories as appliances, which are viewed as prestige factors. It is not known if health care is a prestige item.

Occupational Environment

In 1968, there were 400,000 persons gainfully employed in Panama. Of these, approximately 40% were involved in agriculture, forestry, or fishing; 20% in services; 10% in industry; 10% in commerce; 5% in construction; 5% in Canal Zone services; and the remaining in transportation, communication, and utilities services activities.

Agriculture

There are no figures available for the number of agricultural workers involved in the production of specific crops, but from crop production figures it is possible to make some assumptions regarding the relative degree of involvement in the production of certain crops. The production of rice uses more land than any other crop and occupies a large percent or agricultural workers. This is particularly significant for the health hazards it may present. Paddy rice, such as that grown in Panama, is grown in water-soaked fields which can easily be infested and provide a means of transmission for the helminthic diseases.

From the reporting health centers and hospitals, in 1967, helminthic infections were the second most frequent cause for medical consultation. They numbered approximately 30,000 and represent reports from approximately one-half of all institutions. (Table 3) In the laboratory, investigations for parasites were positive. The wasted deaths and disability of agricultural workers are a loss that Panama cannot afford, since each year the number of those involved in agricultural activities decreases as rural inhabitants migrate to the urban areas; at the same time, the population increases, with the result that there is not enough food being produced for the population.

Industry

Industrial employees are faced with a number of occupational hazards. Much of the industry of Panama is concentrated in and around the City of Panama because of the availability of electric power, good transportation systems, trained labor, and housing. Industrial establishments are primarily engaged in the processing of raw materials for export and in the production of light consumer goods. Of all industrial establishments in 1968, only ten employed more than 200 persons.

Due in part to the small size of the industries and perhaps their limited funds, the services to the employees are minimal. In 1957, a study was completed that reviewed the industrial hygiene problems of the City of Panama. Only the industries of the capital city were studied as it was felt that they sufficiently represented the industrial sector. In 1968, over two-thirds of all industries were located in Panama province, and most of these were probably in Panama City.

Industries are legally obliged to pay the costs of occupational diseases and accidents and to carry insurance against these risks. However, the study points out that industries take almost no measures to prevent those diseases or accidents.

Of the 214 industries surveyed, none had full or part-time doctors or nurses on location, only one had a doctor on call, and all had only first-aid supplies, but none had anyone trained in the use of the supplies. There were no safety directors, only a few safety committees, and a very limited number of educational programs in accident prevention. There are no current figures for those involved in occupational accidents. However, the figures for deaths caused by accidents other than those by motor vehicles show that in 1968, 364 persons died of this cause. Accidents are the leading cause of death in the working age population 15-44 and account for 17% of all deaths in this age group. Since all of these were probably not home accidents, it appears that a significant number of workers are at risk of fatal occupational accidents. Non-fatal injuries incurred at work may produce long-term or permanent disability. In addition to personal costs, such injuries have economic costs to the society, particularly

those costs of lost skilled workers and the resulting unemployment. These costs may be very high because of the frequency of such accidents. At least some accidents could have been prevented were there some system for educating employees in accident prevention and if industry were concerned about design of equipment. Education of the employees in some form of first aid or some other means of providing immediate care could possibly prevent some of the deaths that result from accidents.

In addition to accidents, industrial workers are particularly susceptible to certain diseases. Lung diseases that are caused by the inhalation of dusts and toxic substances are significant. In 1968, 334 persons died of chronic respiratory diseases. It is not known to what extent industrial exposure was a precipitating factor. Although there are many hazards in industries, there are also means available for the control of these hazards. The study of industries in Panama City gives the estimate that some 6000 workers experienced a possible 30,000 hazardous exposures. (Table 14) Of all exposures, only 20% were protected by some form of control. This control was primarily in the form of a local exhaust system or protective clothing. Although the figures given for the number of exposures are estimates, the calculations regarding the amount of protection afforded the workers are at least indicative of the inadequacy of coverage. The type of exposures and protective measures are given in more detail in table 14.

The study of industries described above was completed thirteen years ago. It is difficult to know if the conditions continue as there are no follow-up studies available. If the control measures in industry are still inadequate, even if improved over the 1957 sitution, there is danger of a continued increase in these preventable occupational accidents and diseases. Those who have in-migrated to the urban areas from the farms are at high risk of accidents. If they have not been given adequate instruction in its use and education regarding accident prevention methods, they may easily become the victims of preventable accidents.

Industrial development, a goal of Panamanian economic development, will be difficult to achieve if the labor force needed is at constant risk of preventable accidents and diseases. The well-being of the laborer is the responsibility of the Ministry of Labor. Efforts should be made to incorporate health aims into this area.

Canal Zone

Those who work in the Canal Zone experience healthy physical surroundings and benefit from the medical care provided by the Zone facilities. However, medical care is provided for their families only if they are legally married and the children are legitimate.

Others

The health conditions of workers in the other categories are not known. They account for the remaining 45% of the labor force.

Educational Environment

The education system of Panama is described in the appendix. It has been pointed out that the physical facilities used for education are in many cases in poor condition and not conducive to the development of good health habits. Particularly in the rural areas, the schools lack water and sewerage facilities, and in both urban and rural school systems little attempt has been made to use the classroom as a means of teaching basic health habits. Instead of providing for an atmosphere for healthy living, the schools offer a negative situation.

Although the National Plan for Education recommends the creation of a healthy environment in the schools and the institution of health education and school health programs, there is no plan identified for the financing or implementation of these programs.

Recreational Environment

Swimming is probably the major form of recreation that contributes to disease in Panama. In addition to the many enteric infections and also helminthic infections, hepatitis causes significant morbidity in the young. The costs of these diseases are discussed in another section. In a hot and humid climate, it would be difficult to control swimming practices, particularly of the young. Rather, the water conditions will have to be improved, or some means of combatting the organisms that infect the body must be employed.

POPULATION TRENDS

The population of Panama is expected to increase vastly in the near future. The dilemma that the Panamanian government faces is that not only must it provide necessary services such as water supplies, schools, and health facilities to the present population, but that in the next twenty years twice as many people will need these services.

Moreover, certain trends within the population growth aggravate the situation. The rate of natural increase is expected to rise so that the population will expand even more rapidly in the future. The younger groups of the population are increasing in their proportion to the total population, so that persons of working age have to provide for a relatively larger number of dependent persons. Migration from the rural areas to the cities continues so that new problems arise due to the great concentrations of people.

A successful family planning program should counteract these deleterious trends within the population. Eve· with such a program, however, the population will expand greatly. In some instances, the problems of providing goods and services to an increased population can be solved independently of population programs. For example, application of new techniques of new agriculture could greatly expand the food supply to feed the larger population. On the other hand, a successful family planning program would ease the burden of expanding population and make the social and economic development of the country more possible.

As of January 1, 1970, the population of Panama was estimated at 1.4 million people. If the population continues to grow at the current rate of increase of 3.3% per year, it will double in 20 years and triple by the year 2001. Barring the occurrence of major events affecting population--wars, epidemics, migration--Panama's population will climb to 1.6 million by 1975, 1.9 million by 1980, 2.8 million by 1990, and 4.1 million by the year 2001. Moreover, the rate of annual increase will rise significantly from 3.3% annually in 1970 to 3.7% by 2001. In short, Panama's population will increase greatly and will continue to increase at a greater rate. (Tables 5 and 6)

Urban-Rural Distribution of the Population

In 1960, 41.5% of the country's population was classed as urban. This number was expected to exceed 50% in the 1970's. There is no question that urban areas are growing more rapidly than rural areas. In the period from 1964 to 1970, the population of the country as a whole increased by 21.4%. However, the rural areas increased by only 13.0%, while the urban areas grew by 32.2%. (Table 39)

The census definition of "urban" as a settlement of 1500 people meeting certain indices of development (electricity, water supply, school, etc.) may be misleading. Provisional data from the 1970 census show that only eight cities had populations over 10,000, while at least 14 other "urban localities" had populations between 1500 and 10,000. Although the residents of these smaller settlements are classed as "urban," their way of life is probably more similar to that found in the rural areas. However, these small cities account for only about 5% of the nation's population and thus do not greatly exaggerate the estimates of total urban population.

Data from the 1970 census show that even the small cities grew more rapidly than the rural areas over the past decade. On the average, the larger cities grew even more, increasing about 50% in the decade 1960 to 1970. The largest cities in the country are the two cities at either end of the Canal, Panama City and Colon, which together include about one-third of the total population of Panama.

The growth rates of these two cities differed markedly over the past decade. Panama City, six times as large as Colon and including 28.8% of the country's population, grew by 51%. At the same time, the urban areas just outside of Panama City grew at phenomenal rates far above any in the country. Colon, on the other hand, grew by only 13%, reflecting emigration and a high mortality rate.

In short, the process of migration from rural to urban areas continued in the 1960's. Panama City, the only really large metropolitan area in the country, grew rapidly, and a movement began toward the outskirts and areas outside of the city. These trends can be expected to intensify in future years.

Age Distribution of the Population

Like many developing countries, Panama has a very "young" population. In 1970, an estimated 52.5% of the total population was under the age of 19; 22.4% of the population was between the ages of 0 to 6 years; 21.9% was within the compulsory schooling ages of 7 to 14; 52.3% was of the working ages of 15 to 64; 3.3% was in the non-working group of 65 years and older. This distribution is shown in more detail in Table 7.

Exact data are not available to show how the age distribution of the population changed over the past decade. Estimates are that the proportions of the youngest age groups increased and that this trend will continue in future decades. Most probably, this reflects more births combined with reduced infant mortality and greater attention to health. (Table 8)

The Significance of Population Increase

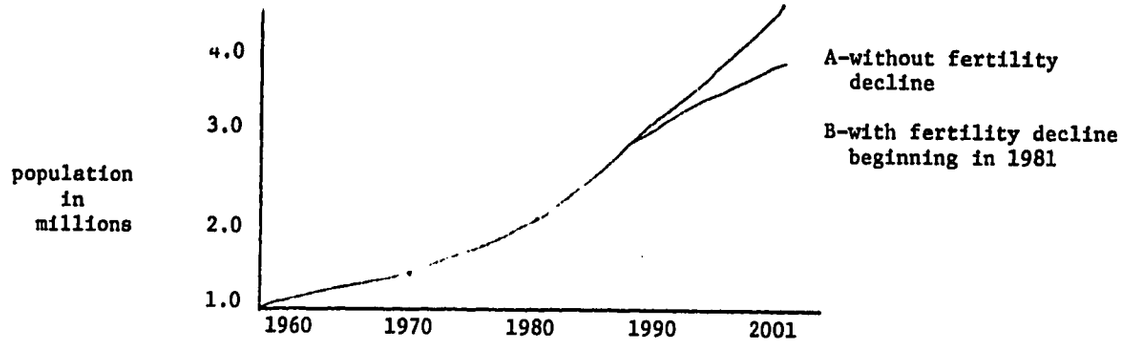
The population of Panama is among the smallest of Latin American nations. Even with the projected tripling of the population in the next thirty years, there is little prospect that Panama as a whole will suffer from sheer physical overcrowding. Rather, the problem is that the absolute gains made by a developing country such as Panama may be nullified by the needs of an expanding population. For example, doubling Panama's agricultural production over the next thirty years may be an absolute gain, but if the population triples, the production per capita will actually be less. The problem of population increase is complex, but serious enough that USAID is devoting increasingly more money to family planning programs for Panama.

Any family planning program in Panama faces a basic obstacle that health services, through which such programs could be provided, are not available to part of the urban and most of the rural population. In 1968, a program carried out by APLAFA (The Panamanian Family Planning Association) reached an estimated 4% of the women of childbearing age. Clearly, that program alone at that level would not be an effective population control.

A recent study of Panama's population estimated alternative trends in national fertility levels. The study compared projected population trends if such a decline began in 1981 with projected trends if there were no decline. The study's projections should not be taken as exact predictions of the effects of a family planning program; clearly, the effects would vary depending on the nature and extent of the program. Nevertheless, the study does give a good idea of what effect a successful family planning program instituted in the 1970's could have on Panama's future population trends. The following are the major effects:

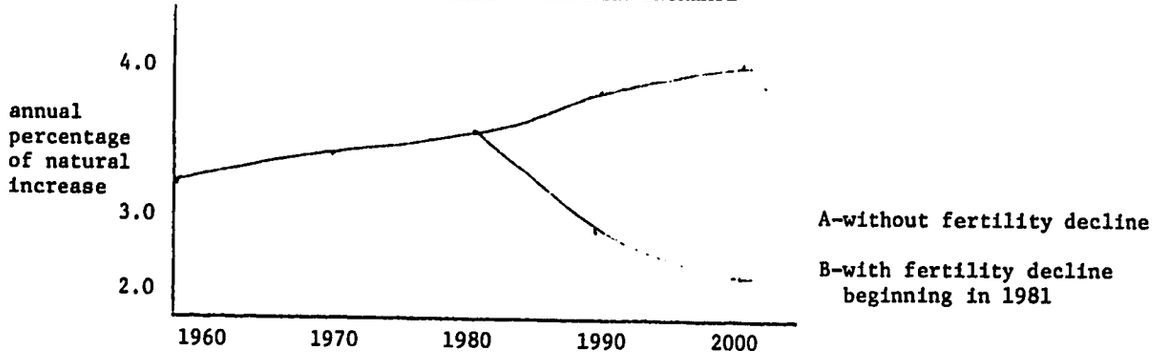
1. The population will probably increase vastly whether or not a family planning program is effective. If fertility does not decline from the present level, the population of 2.015 million in 1981 will rise to 2.767 million by 1990 and 4.114 million by the year 2001. If the decline begins in 1981, the population will still reach 2.712 million by 1990 and 3.677 by 2001. A family planning program will not eliminate Panama's need to expand services and production for a vastly increased population. On the other hand, with the decline in fertility rates there would be 0.437 million (437,000) fewer people by the year 2001, and this would ease the burden of expansion. These projections are shown :

POPULATION INCREASE *



2. A decline in fertility rates would lead to a similar decline in the annual rate of natural population increase. Without a decline, the rate of natural increase will rise from 3.3% annually in 1970 to 3.7% by 2001. With a decline, the annual rate will drop to 2.5% by 2001. The population would continue to increase, but it would grow at a decreasing rather than an increasing rate. These projections are shown below:

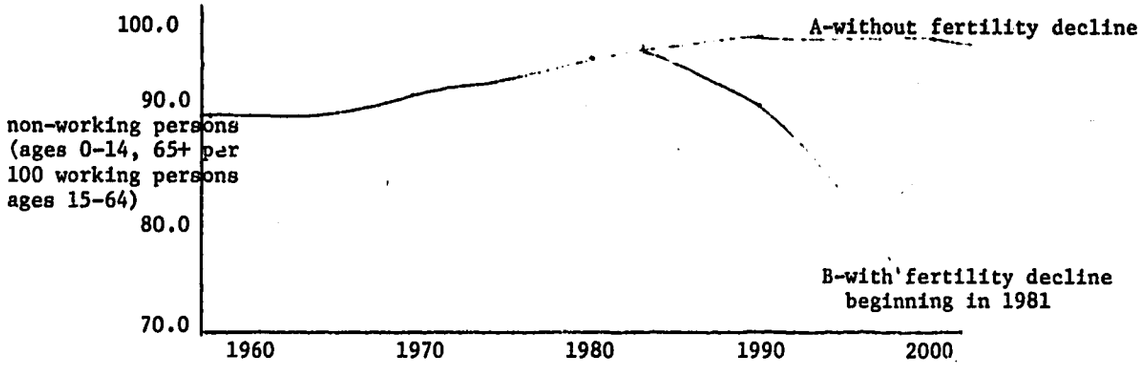
RATE OF NATURAL INCREASE



3. The study does not project trends for the increase of the urban and rural populations. Presumably, the trend toward urbanization will accelerate as the population grows. A decline in national fertility rates should lessen the urban increase. In addition, family planning programs may be more successful in urban areas where health services are more available to greater concentrations of people than in the rural areas. At any rate, increased population will aggravate the already existing problem of providing sufficient urban services such as housing, water supply, health care, etc.

4. As the population increases, the younger age groups grow in proportion to the total population. This means that there are relatively fewer persons of working age to provide goods and services for the persons of non-working ages. In 1970, the working-age population. Without a decline in fertility rates, this number will have fallen to 51.9% by 1975 and to 51% by 2001. Put differently, in terms of dependency ratios, there are 90.9 persons of non-working ages (0 to 14 and 65 and over) for every 100 persons of working age in 1970. Without a decline in fertility rates, this figure climbs to 93.2 per 100 by 1975, to 94.7 by 1980 and 96.2 by 2001. When one realizes that the figures for the working age population include all women of those ages and all unemployed males, the ratios worsen. With a decline in fertility rates, the figures fall markedly to 76.5 persons of non-working ages per 100 persons of working ages by the year 2001. These projections are shown at the top of the next page:

DEPENDENCY RATIOS *



* Graph does not include Zero reference point.

NATIONAL HEALTH STATUS

Derivation of a national health status from available mortality data and scant morbidity data is indeed a hazardous procedure which can result in misplaced emphasis upon certain diseases and unawareness of significant problems not identified within the reporting system. The interpretation of mortality data carries with it certain significant problems.

a. It provides only some indication of the underlying cause of death with no information about nonfatal or fatal concurrent disease.

b. Deaths reported are not necessarily certified by a physician. Such reports are questionable in part because of the deficiency of medical knowledge in diagnosis and because of the influence of medical fads among lay and paraprofessional personnel. These death certifications must generally be discounted.

c. Most important, mortality data provide little insight into the disease load carried by the live population.

In an advanced society the limitations of these data are important because of the increased role of chronic and noncommunicable diseases. Where communicable diseases are the primary causes of death, mortality data can be valuable. Mortality data are meaningful for Panama because several leading causes of death are attributed to communicable diseases. However, Panama is in many ways a transitional society in which the range of extremes is great. The rural areas are characterized by a traditional and agricultural social structure with poorly distributed facilities and few available services. This is true particularly for health care and is accompanied by a rather significant disease load, especially of the acute communicable diseases.

The urban areas are undergoing rapid transition with an influx of population, rapid urban growth, creation of urban slums and outstripping of available resources: water, sewerage, sanitation, transportation, and employment. Health coverage, at least for the extreme moments of birth and death, is generally available although the quality of such coverage varies greatly. Modern, sophisticated, comprehensive, and specialized care exists within the cities of Panama and Colon, although the availability of such services to large segments of these urban population is certainly open to question.

Mortality Data

Leading Causes of Death

A review of the leading causes of death reemphasizes the transitional nature of Panamanian

society and especially the rapid changes with which the health care system must deal. The first four leading causes for 1968 include: (1) ischemic heart disease (2) cancer (3) accidents, poisonings, and suicides (4) stroke. Heart disease, cancer, and stroke account for 30% of all deaths medically certified. These causes of death indicate the relatively advanced standard of living of many Panamanian people and demonstrate sufficient longevity to allow for the development and manifestation of these chronic diseases. Ranking third, the violent causes of death account for approximately 8 1/4% of all medically certified deaths and suggest an area in which improvement could be anticipated in preventing their development. The remaining six leading causes of death are essentially a collection of communicable diseases, pneumonia, enteritides, tuberculosis, and another large group including diseases of the new born--birth injuries, anoxia, and other causes of mortality in infants less than one year of age. The tenth rank is occupied by other diseases of the heart and by congenital anomalies. It is significant that these ten causes of death account for approximately 65% of all deaths medically certified and, considering the preventable and treatable nature of many of the conditions, identify areas in which public health activity might be fruitful. Winslow writes: "In addition to the loss of life-capital through premature death, preventable disease imposes a heavy burden in the loss of productive power, due to nonfatal but disabling illness and in increased needs for the medical and institutional care of those afflicted." Specific data on the ten leading causes of death for 1967 and 1968 are presented in Table 10.

Further data on the ten leading causes of death broken into age ranges for the years 1964, 1965, and 1966 are presented in the Tables 11 a-f. The major categories, heart disease, cancer, and stroke account for a larger mortality load; in addition, a significant number of deaths are attributed to preventable and treatable communicable diseases for these years. Perhaps more useful is the analysis of deaths in specific age ranges.

1. Ages 1-4 years (Table 11b): Of the deaths in this age category, approximately 46% are attributed to communicable disease, notably gastritis-enteritis, influenza-pneumonia, bronchitis, whooping cough, measles, tuberculosis, and diphtheria. Anemias and accidents are also significant. The effects of these diseases are exaggerated by the malnutrition prevalent in this age range. (A Ministry of Health Survey showed that approximately 61% of children under age five suffer some degree of protein-calorie malnutrition.) Furthermore, it is obvious that at least theoretically the 15% of deaths in this age group attributable to preventable diseases could have been averted by appropriate immunization, and approximately an additional 15-20% of the deaths (especially gastritis, enteritis, pneumonia-bronchitis, and TB) could have been averted by safe water supplies, accessible medical care, and a reasonable state of nutrition. By this rationale, a conservative estimate would be that approximately 400 deaths of 1373 deaths of children in the age range 1-4 years were readily preventable in the year 1966 by the application of simple, effective, known techniques.

2. Ages 5-14 (Table 11c): This is the age in which the society makes a major investment in children, especially in terms of education. Disease takes its toll here in deaths, which represent a major loss of youth and consequently a loss of investment. Insofar as causes of death reflect illness suffered in the surviving population, these diseases impose a major burden which hinders normal growth and development and learning activity. Accidents head the list of causes of death, ranging between 13-18% of all causes. This suggests the need for concern by both school and health officials with the design of the environment and the teaching of accident prevention. Again, communicable diseases contribute to a large proportion of deaths, with tuberculosis high on the list. Anemias as second cause reflect the problems of malnutrition, and along with enteritis give some insight into the significance of intestinal and parasitic diseases that might be prevented through effective environmental sanitation and personal hygiene. The large role played by diseases for which immunization is available reflects the currently inadequate coverage of the susceptible population by immunization services and the margin by which deaths might have been averted in this age range.

3. Ages 15-44 (Table 11d): Included in this group are those in the working age population upon whom the economy is primarily dependent. Again, accidents are a significant cause of mortality (approximately 17%), and when combined with the other violent causes of death, homicide and suicide, the total of 27% is of major concern. It can be reasonably assumed that accidents are also a major cause of morbidity and

impose a burden on the health care system. To a significant extent these are consequences of the rapid urbanization; until 1968, traffic accidents were especially numerous because of nonmechanized traffic control in the cities.

This has been an area of recent corrective measures in Panama City. Urban planning and the design of good transportation systems within the urban areas of Panama and Colon should reduce this toll.

Tuberculosis is the second leading cause of death in this age group. To a great extent, this disease can be prevented and treated. Important is the chronic debilitating nature of the disease, accounting for long-standing severe disability before eventual death. The costs to society in deaths and disability, lost wages, increased consumption of resources, and medical care are estimated in a later section.

In this age group, deliveries and complications of pregnancy are also a problem, relating directly to the maldistribution of medical care, especially in the rural areas where 63% of deliveries have no professional attendance.

4. Ages 45-64 (Table 11e): As expected, in this productive age group, heart disease, cancer, and stroke become the leading causes of death. Tuberculosis, influenza-pneumonia, and anemias are still significant causes, but together account for only 10% (approximately 120) deaths in this age range. Here the burden of care rests primarily upon the therapeutic resources of the health care system, and practical preventive techniques (better nutrition, parasite control, tuberculosis control) will influence only about 10% of deaths in this age range.

5. Ages 65 and over (Table 14): The pattern for this age range is essentially the same as in the above group, showing some predictable increase in the death attributable to stroke.

Deaths from Communicable Diseases

Table 12a presents data on communicable disease deaths by rank, cause and medical certification for the year 1968. (Also Table 12b) Communicable diseases which are leading causes of death are enteritides, dysenteries, pneumonia, tuberculosis, and tetanus. Consideration of these diseases will follow separately, but it is interesting to note that the percent of medical certification compared to total deaths varies with the nature of each disease. Generally, medical attention is much less available in fatal cases of a rapidly evolving disease than in cases of slowly developing disease.

For deaths ascribed to tetanus, only 46% were medically certified. Possibly the remaining 54% are due to nonmedical persons mistakenly diagnosing the cause of death as tetanus. However, because tetanus has such dramatic symptoms and is almost always fatal, it is generally recognizable even by nonmedical persons. If the diagnosis is correct and tetanus is the true cause of death, this means that in 54% of fatal tetanus cases medical personnel were not in attendance.

On the other hand, of the 285 deaths ascribed to tuberculosis, approximately 76% are based upon medical certification. The assumption is that the duration of this chronic debilitating disease and the persistence in severity of the symptoms are sufficient to motivate the patient to seek medical care and yet allow sufficient time that he may be seen. Tuberculosis deaths are generally more readily recognized in areas in which tuberculosis control programs are active. This is particularly important in the urban areas of Panama and Colon.

Ranking fifth and sixth among communicable diseases are the childhood diseases,measles and pertussis. These two diseases, which are now readily preventable, accounted for 215 and 273 deaths respectively in 1968. That only 29 and 15% respectively of deaths were medically certified to these causes again suggests nonavailability of health care services. It may also reflect parental attitude toward childhood diseases and the general assumption that these are self-limiting diseases.

The combined total of tetanus, pertussis, and measles accounted for 705 deaths, assuming that the reporting of deaths ascribed to pertussis and measles is fairly accurate. These three

diseases thereby account for approximately 7% of all deaths and are significant in that they could be virtually eliminated through universal effective immunization and some modification in hygiene and housing standards.

The combined deaths ascribed to dysenteries and tuberculosis account for 867 deaths, almost 9% of total deaths for 1968. These are significant as they reflect strongly upon the socio-economic standards of housing, environmental sanitation, and nutrition. Although they are infectious diseases, their pattern of spread and their mortality loads can be altered by specific improvement in the standard of living.

In total, it can be suggested that almost 17% * of all deaths and an unknown case load could be dramatically reduced through improvements in housing, water supply, and sewerage systems. The exceedingly high infant and childhood death rates, along with high birth rates, demonstrate that the society spends a major investment in time, care, and money in the production and partial raising of children who die before they become economically productive.

Morbidity Data

Reported Cases of Communicable Disease by Age

Inadequate incidence and prevalence data understate the true disease load but can provide some insight into the disease patterns observed within the medical care system. Table 13 presents cases of selected communicable diseases by age for the year 1965. Similar data are reported for 1966 in Table 1. These tables show age ranges in which the population might be at considerable risk for the selected diseases. In the system used in Panama, age ranges of reported data are not uniform size and hence the information is vulnerable to misinterpretation. It is also important to observe that reported cases of selected lethal diseases do not even equal the total number of deaths, e.g. for tetanus in 1965 there were reported 132 cases, but 216 deaths. (Table 12b) However, some very useful preliminary conclusions can be developed using the reported case data presented in Table 13.

1. Children between the ages of 5 months and 5 years are particularly at risk of developing dysentery of such severity that they are seen and reported as cases. At the time of weaning, the child is exposed for the first time to unsafe water systems and to a wide variety of foods of questionable sanitary quality.

2. Reported cases of hepatitis numbered 401 in 1965. Those primarily at risk are in the age range 1-14, with scattered cases in other age groups. Presumably this identifies a population of children not yet immune to disease exposed to contaminated water by swimming and drinking.

3. The age distribution of malaria is relatively uniform after the first birthday, with a tapering off of reported cases after the 15th birthday. This decrease probably represents considerable underreporting within the adult population prior to intensification of the malaria eradication program.

4. The patterns for measles and pertussis cluster in the age range of 6 months to 15 years. There were 607 cases of measles reported in this age range out of a total of 492 cases and a total of 82 deaths (age at death unknown). For pertussis there were 1,330 cases in the age range 6 months to 15 years out of a total of 1,413 cases, and a total of 99 deaths, age unknown. This pattern of fatality is as anticipated.

5. Of the 132 cases of tetanus reported by age in 1965, 99 occurred in infants under one year, and 88 of these occurred in infants under five months. This suggests that these 88 cases are probably tetanus neonatorum and therefore strongly associated with obstetric practice and hygiene of the neonate. These tetanus deaths are theoretically fully preventable by education and simple modification of the patterns of care of the newborn.

* Consists of deaths from enteritis and dysenterics, pneumonia, tuberculosis, tetanus, and helminthiasis: (Table 12a)

This especially points to the problems of availability of adequate medical care for a significant portion of the population. The remaining cases and subsequent deaths are likewise preventable through appropriate immunization. Immunization of pregnant women is also recommended for the effective reduction of tetanus neonatorum. (Table 14B)

6. Although tuberculosis occurs in all age ranges, it is a particularly significant problem in children and infants under five years. This age group accounts for almost 20% of the reported cases for 1965.

Data from Medical Consultations

Data on the cause, frequency, distribution, and effectiveness of medical consultations and of hospitalizations are insufficient alone to make major decisions for health programs. However, combined with other data in the report, the consultation data support the identification of health problems. (Table 3)

The medical conditions for which the population seeks care are obtained from reporting data from selected health centers and hospitals for the year 1967. The most frequent cause for consultation is dental disease, and 60% of these consultations are provided for the school-age population. Ranking second are the helminthic infections, which accounted for nearly 28,500 consultations, 25% of which were in the population under five years of age. Other large-volume consultations were for diseases of the respiratory tract, accidents, enteritis and diseases of the genitourinary tract. There are no data about the type of services provided or the relative consumption of preventive as compared to curative services. However, it is apparent that the large volume of consultations could be effective if basic preventive measures were the central core of services about which diagnostic and curative services were built. Furthermore, the majority of consultations are for diseases essentially preventable: helminthic infections, enteritis, and some respiratory infections. Emphasis on good nutrition, hygiene, and accident prevention could greatly alter the pattern of consultations.

Data from Hospitalizations

Hospitalization data are obtained from the Hospital Santo Tomas for the year 1966. By far, the most frequent causes of hospitalization are conditions related to pregnancy: normal delivery, complications of pregnancy, and abortions. In all, these numbered some 15,500 discharges, of which nearly 6,000 were attributed to abnormal states. The second most common cause is the miscellaneous category: special studies and examinations. Ranking third are diseases of the genitourinary tract. Accidents and violent episodes, the fourth ranking cause, accounted for 1,361 discharges. The fifth place is occupied by intestinal obstructions and hernias.

It is clear that abnormalities of the genital system, especially abortions and complications of pregnancy make up a large number of hospital discharges. To a great extent these conditions are related to poor nutritional status, infectious diseases, intestinal parasitism, and availability of quality medical care. If the hospital admissions are representative of the disease problems of the population, there must be a great wastage of pregnancy. Such wastage causes suffering and economic loss by disability and calls for effective maternal health services.

The short average duration of stay in the hospital reflects characteristics of the medical problems for which hospitalization has been necessary and the relative health status of the population which is hospitalized. Data from 1966 estimate average duration of stay in hospital for all causes at 6.4 days. This is the lowest average duration for all of the Latin American countries, and below the U.S. average of 8.3 days (1962). Pediatric admissions consume a large number of days, averaging 14.2 days per case. This reflects the fragile health status of the pediatric age group. It is significantly less than that of other comparable Latin American countries, but still well above the U.S. average pediatric stay of 6.6 days. The average duration of stay in the nonpediatric category is 5.5 days, the lowest for all of the countries, and reflects the trends of hospitalization for short-duration, acute problems, especially pregnancy and accidents. The short duration of stay cannot be attributed to

hospital over-crowding, since the average daily general hospital is filled only to approximately two-thirds of capacity.

Major demands for health services in the form of consultations and hospitalization relate to the problems of pregnancy, disease of early childhood, illness resulting from unsanitary environment, and accidents. Active maternal and child health programs have been underway for some time, perhaps reflecting social value of mothers and children. In 1965, there were 48 health centers providing maternal and child health care. Nearly 35,400 or 75% of infants under one year were seen in the same centers. Older children did not fare so well. In the age group one to four years, only 50% of children received services at the health centers. (Although more recent data are available from World Health Organization, they are not used here because they report visits, not individuals receiving care.)

In 1965 approximately 23,350 pregnant women, approximately 48% of the population in need, were seen through MCH centers. Pregnant women represent approximately 20% of the total fertile female population (defined as those age 15-44). Only half of the pregnant women receive care through MCH centers. If family planning services are delivered through MCH centers, the theoretical maximum of only 10% of the fertile female population will experience at least a single contact with the service in a given year. Since some degree of nonacceptance, rejection, or dropping out of the program does occur, the theoretical maximum of 10% coverage cannot be met. A conservative estimate of this failure is 20%. Thus, family planning programs which are extended through MCH centers can cover only 8% of the total fertile female population in Panama. It is estimated that the current program covers 4% of this population. Such limited coverage is insufficient in a situation where excessive population growth will result in the placing of heavy burdens on already limited systems.

It is assumed that were basic health services readily available, they would be utilized more frequently by more people than the specialized MCH services. This allows greater opportunity for contact with the patient. If this assumption is correct, then it would be more effective for family planning services to be made available through the basic health service system on a continuing basis and combined with other needed health care.

The above conclusions are drawn using national figures which do not reflect variations in geographic distribution. In general, these statistics support the main conclusions developed in the section, "Observed Health Care Receipt" and point to the major gaps in basic care still to be filled, e.g., distribution of basic health services and personnel, improved nutrition, and health education.

Disease-specific Data

This section is comprised of more detailed discussions of the morbidity and mortality experience in the population from tuberculosis, malaria, and enteric infections. These diseases have been selected for presentation for a number of reasons. Perhaps most important, all three diseases are indicators of socio-economic problems operating at the interface of the health care system with other sectors of the society. In Panama these diseases produce significant disability and death with variations for certain age groups of the population, province of residence, and the availability of health care. Because categorical disease programs for tuberculosis and malaria have been active for some time there is much good data available.

This discussion is not in any way intended to place emphasis especially upon these disease entities in order to initiate further activities but rather to illustrate the way in which certain diseases are manifestations of more basic social and economic or geographic problems.

Tuberculosis

In 1968, the total number of cases of tuberculosis reported had decreased to 10,717 from 12,136 in 1964. (Table 15) This represents a decrease of approximately 12% in the four-year period, during which the population had experienced an increase of 14% over the 1964 level. The Table shows a general trend toward increased specification of the extent of tubercular involvement, an increase in the number of cases designated as minimally advanced pulmonary reinfection, and a general decrease in moderately and severely advanced pulmonary reinfection.

Within the limitations of reporting systems, primary infections decreased significantly,while reporting of extra-pulmonary infections remained relatively constant during these years.

These trends suggest that tuberculosis is a significant disease problem but is increasingly being brought under some degree of control with a trend toward less severe involvement. This is important progress, especially in the light of a rapidly growing population and increasing population density in certain areas.

Tables 16a-e provide more specific data on incidence, prevalence, and mortality of tuberculosis by province and for selected years. Data in Table 16a show that the average incidence is 1.2 cases per thousand population. Two provinces, Cocle and Veraguas, show a rate almost twice as high as the national rate and both show a significant deterioration as judged by a rise in incidence over the six-year period 1963-1968. There is no evidence that this reflects improved reporting. This increase in incidence occurred at the same time as a worsening in the physician/population ratios of both provinces. Other provinces, notably Panama and Colon, have shown marked decreases in the incidence of tuberculosis, demonstrating the effectiveness of the intensive anti-tuberculosis campaigns,.especially for the prevention of new cases in these provinces. At the same time, these two provinces have also improved their physician/population ratios. Thus, the status of the tuberculosis problem correlates well with the availability of medical resources.

Prevalence data presented in Table 16b place the national average at 8.2 cases per thousand population. Three provinces exceed this by a significant margin: Colon has a rate of 11.4; Darien 16.6; and Veragus 11.4. All of these provinces have shown some deterioration of disease status as evidence by rising prevalence rates in the past six years. This has been most pronounced in Darien, where the prevalence rate has more than doubled. If the rising prevalence and incidence rates in selected provinces are a result of new activities or discovery of cases, then the disease status may not be deteriorating and the current rates may more nearly represent the true state. In any case, the three provinces of Colon, Darien, and Veraguas have rates significantly high to warrant comment.

Although a rising prevalence rate from 1966 to 1968 is experienced in Colon Province, some progress is evident because of the decreasing rate of new cases. However, preventive and treatment activities must continue because of the high prevalence rate, the overcrowding in many areas of the city, and the depressed socio-economic conditions of large segments of the population. Unless the residual cases of tuberculosis (numbering roughly 2,350 in the province) are treated and rendered noninfectious, the potential for even greater spread is high. By contrast, Panama Province, with low incidence rates and markedly decreasing prevalence rates is in a much better position and improving.

The high prevalence in Darien is significant along with an above-average incidence rate. Prevalence has risen because of recent decreases in mortality. Plans to complete the Pan-American Highway through the Darien Gap will vastly alter the living situation of the residents and make demands upon limited facilities. There are approximately 24,000 residents in Darien and approximately 400 cases of tuberculosis. With new construction workers arriving, living in ramshackle huts and mixing with the local population, tuberculosis could become a significant cause of worker disability and increase the demand upon already limited service. There are only two physicians in the province--a decrease from the 1964 level and a population load per physician far in excess of the national level. Darien has a malaria rate roughly 10 times the national average. Combined, tuberculosis and malaria could overload the already burdened health facilities of the province and result in significant disability of the worker population.

Finally, the problem in Veraguas with high incidence and high prevalence rates correlates closely with the decrease in the availability of health services, particularly the very low physician/population ratio.

Mortality data probably are the most accurate of any of the series. Table 16c presents mortality rates due to tuberculosis by province for the years 1961 to 1968 inclusive. During the eight-year period, there has been a moderate decrease in the mortality rate from 22.6/100,000 population in 1961, to 20.8/100,000 population for 1968. Most of the decrease is a result of a dramatic drop in the tuberculosis mortality in the provinces of Panama, Darien, and Los Santos. However, at the same time there has been a marked increase in mortality due to

tuberculosis in the provinces of Veraguas and Bocas del Toro and moderate increases in Colon, Cocle, and Chiriqui. It is apparent that Bocas del Toro has a significant tuberculosis problem. The Ministry of Health considers the low prevalence and incidence rates reported for this province as not representative because no anti-tuberculosis campaign has been operating in the province to provide the necessary data. Colon and Veraguas Provinces have mortality rates one and one-half to two times the national average, lending credence to the high incidence and prevalence rates reported for these provinces. For Colon Province, this presumably represents the combined effects of urbanization, low socio-economic status, and probably economic barriers to otherwise available medical services. For Veraguas, the most important factor is probably the dwindling supply of health services. Darien presents a problem not readily explained. There was a dramatic increase in tuberculosis mortality, reaching a high in 1963 and dropping erratically to a low in 1967 and 1968. At the same time, prevalence has risen and incidence has dropped. This suggests that rising mortality in 1962 and 1963 led to the initiation of therapeutic and preventive measures which averted deaths (hence increasing the prevalence of cases by keeping alive those who otherwise would have died) and prevented new cases (thus reducing the rates of incidence). Unfortunately, this interpretation cannot be verified without access to epidemiologic surveillance records.

Tables 16d and 16c present incidence and prevalence rates by province and by age groups for 1968. As expected, the incidence rates are particularly high in the older adults (45 years and over), and in the over-65-year age group the rates are more than double the national average. The same pattern of disease by province persists, with Veraguas and Cocle having very high rates, followed by Darien and Colon. In these provinces, the risk of developing tuberculosis is high for everyone of working age. Likewise, the prevalence data show the highest rates with Colon Province at the top of the list. Again, the whole working-age population in these four provinces has a high prevalence of tuberculosis, although the peak is generally after the age of 65.

Tuberculosis in the population is one of several disease indicators of the level of socio-economic development. The data presented above imply the relationship of tuberculosis to socio-economic conditions and availability of care. This is especially shown in Colon Province with crowded urban slums and inadequate care available; in Veraguas Province, with a decreasing physician population; and in Darien Province, also with inadequate availability of health care and the implications this has for the future building of the Pan-American Highway. Tuberculosis as a chronic, debilitating disease is particularly important in Panama because it afflicts a significant portion of the population and places a burden upon the society. Some estimates of this burden by illustrative diseases, including tuberculosis, are presented in the section, "Costs of Disease."

Enteric Infections

The significance of the enteric infections is indicated by both high morbidity and high mortality. Enteritis and dysentery are the terms used to report deaths and a few cases of illness. "Gastroenteritis" is the disease category ascribed to the seeking of medical consultations and as a cause of hospitalization. It is believed that these are all closely related enteric infections. Enteritis and dysentery combined are the leading cause of death in children between five and fourteen years. Annual deaths ascribed to these causes run approximately 550 to 575. Annual reported cases approximate 1000. This clearly represents underreporting of diseases, as a case fatality rate using this data would exceed 50%, a highly unlikely situation for this disease.

Selected reporting institutions providing medical consultations and hospitalizations are the source of data for gastroenteritis. In 1967, gastroenteritis was the third ranking cause for hospitalization and the eighth ranking cause for medical consultation. These diseases accounted for about 1400 hospitalizations and 12,700 medical consultations in these reporting centers. Infants and children under four years accounted for nearly 10,000 of these medical consultations, and approximately 450 of the hospitalizations. Since this is only partial reporting from certain centers, the disease load in the communities is considerably greater.

The enteric infections are notable because the prevalence of the diseases correlates directly with the sanitary status of the environment, including the safety of food and water supplies and the disposal of sewerage and wastes. These diseases complicate the problems of malnutrition, especially in the rapidly growing infant and child. This is expecially important for protein deficiency, because of poor absorption and excess losses. In children, the combination of protein caloric deficit, enteritis, and other infectious diseases is highly lethal as is demonstrated by the patterns of deaths and illnesses in this group.

It is reasonable to believe that most significant cases of dysentery and enteritis occur in the rural areas, although there is no specific data with which to document this. In general, rural areas do not have safe water supplies or purification systems. It is felt that the water supply systems for the cities of Panama and Colon are safe for the present. These systems are distributed from within the Canal Zone and operated by the Canal Zone Company. However, it appears that as demands for services from these two cities continue to grow at a rapid rate, the adequacy and safety of the water supply systems will soon come into jeopardy.

Panama is seeking to encourage the development of a large tourist industry based upon its climate, seaside resorts, and the health and safety of the environment. In order for this to be successful, continuing emphasis must be placed upon the development of adequate water and sewer systems. Continuing control should also be imposed upon food processing and food handling establishments.

Responsibility for the safety and sanitation of the environment rests with separate agencies. The Ministry of Health through its Divivion of Pharmacy, Food and Drugs is responsible for the inspection and control of food processing and handling. An autonomous agency, IDAAN (Instituto de Acueductos y Alcantarillados Nacionales) is responsible for the planning, construction, operation, and sanitary control of water and sewer systems in the Republic. The activities of IDAAN have been summarized in the section of Living Conditions, and its foreign support is presented in table form in the Inventory of External Assistance Programs for Panama.

As with tuberculosis, enteric infections can be considered disease indicators of the level of socio-economic development. Disappearance of tuberculosis correlates closely with quality of housing and work environment and improved levels of income, education, and nutrition. The enteric infections are indicators of the hazards inherent in the environment, in particular the cleanliness of water and food. The enteric infections alone are significant causes of illness and death. However, they also are particularly severe in the triad with malnutrition and preventable childhood illness. The result is unnecessary illness and death, and significant economic costs represented by the demand for care and the loss of food in a population already poorly nourished.

Malaria

Malaria is a major source of disability. The number of deaths from malaria remains small (25 in 1965, 29 in 1966 and by medical certification, one in 1967, and 3 in 1968). The prevalence rate is, however, high--the median of reported cases in the period 1960-1964 is 3,416. Data given in Table 17 present the experience for 1964, 1965, 1966, and July 1968 - June 1969. The number of cases reported in 1964 and 1965 was considerably lower. This number has recently risen and approaches the 1960-1964 median, probably the result of current increased case reporting. The number of laboratory-confirmed cases is now estimated to be between 3,300 and 3,600 annually.

The information from the period 1968-1969 is based upon the work of the SNEM (Servicio Nacional de Erradicacion de la Malaria) involving examination of 71,407 blood smears. Of these, four percent, or 3,344, were positive. Parasite identification was P. falciparum accounting for 56, with P. vivax accounting for most of the remainder, and a few mixed infections. (Table 17)

Table 18 presents data on the examination of blood smears over an 18-month period. Positive smears ran at a low level for many months with an upswing in March and a 4-to 5-fold increase

for the period from April through October. This may be the result of the seasonal transmission related to rainfall. Probably, it also reflects better case finding and reporting. Other than for an eradication program, the best investment of resources for the diagnosis of malaria by examination of blood smears, followed by definitive treatment of the positives, will be concentrated through the 6-month period April-October, when transmission appears to be at its peak. A screening program should continue during the remaining months, even if on a selective basis, to assure delineation of the areas which serve as a reservoir and from which transmission will spread when conditions are favorable.

If the assumption is made that "an average case" may represent three febrile episodes weekly over a 10-week period, then approximately 30 workdays will be lost by each of the 3,500 cases annually. If the timing of peak prevalence affecting large numbers of people coincides with the building of roads or harvesting of crops, the impact of the disease will be very severe. Efficiency of the worker will be affected not only during the period of high fever but also during the intervals between febrile episodes. The situation will vary by province and the agricultural crop, in terms of the latter's relationship to rainfall.

Table 18 presents data on the distribution of reported cases in 1965 and 1966 by province. Reporting data show that malaria is especially prevalent in the provinces of Chiriqui, Panama, Darien, and Colon. The table also presents data giving estimates of the population at risk and calculated rates per 100,000 population. The calculated rates vary remarkably from a low of 16,100,000 for Herrera to a high of 765/100,000 for Darien in 1965. In 1966, the rates vary from a low of 55/100,000 for Herrera to a high of 2510/100,000 for Darien. Using 1966 rates, Darien province ranks first, with Chiriqui second, Colon third, and Los Santos fourth. These four provinces are the areas in which malaria identification and eradication should have the highest payoff, not only in relative terms, but also in absolute numbers.

The situation in the Province of Darien merits special attention. The terrain is difficult, and much of the area is covered by dense and nearly impenetrable jungle. The only section of the Pan American Highway yet to be completed will have to pass through Darien. The government of Panama has declared its intention to build the Highway, and a feasibility study is now in progress. It is important that when the costs of this venture are estimated, they include provision for the control of malaria not only for the construction workers employed on the project, but also for the increased numbers of people who will be attracted to the area either as residents or in passage. Given estimated traffic loads, duration of transit, and other pertinent data, it should be possible to estimate the increased case load of malaria and the costs of control. The latter will include prevention and treatment and could include an expansion of the eradication program within Darien. Given the appropriate information, it will also be possible to estimate the extent of increased transmission of malaria and the consequent disease burden that will be imposed on workers and others in the area if counter measures were not planned before the project is started.

Malaria does not take as high a toll in lives as tuberculosis, but it is an important factor in the development of an area. Large areas remain unused for agricultural or other economic development in part because the presence of malaria makes these areas unfit or dangerous for human life.

THE COST OF DISEASE

The impact of a disease upon a society has traditionally been considered in terms of the number of lives lost as a result of the disease, the numbers of ill or disabled persons afflicted with the disease, or the degree and length of suffering caused by the disease. While these considerations are essential they do not identify the full burden placed upon the society. Disease also carries certain economic costs which are borne by the society--the direct costs of prevention and care and certain indirect costs which are often borne without the knowledge of the society. The direct costs can be consciously reduced through decisions to ignore the problem. Indirect costs, however, remain the same or increase if the disease problem is ignored. They can be reduced only through prevention or eradication of the disease. Both direct and indirect costs have been estimated in the following pages. Emphasis has been placed upon the indirect costs in order to illustrate the magnitude of the hidden burden of disease to the society.

The costs are presented in terms of approximate figures which are based upon reasonable and conservative estimates of the situation. Three diseases--tuberculosis, enteric infections, and malaria--are used here as models. Combined, they represent a significant portion of the disease load for Panama. Individually, they relate directly to the level of socio-economic development or the geographic characteristics of the country.

This presentation does not attempt to delineate the relative importance of any specific disease based solely upon economic considerations. It shows one of the techniques for dealing with the problem of resource allocation within the planning process.

There are six types of costs presented here. Some of these costs are considered in more detail than others. The method for calculating the costs is presented as follows:

1. The direct costs of diagnosis and care:

   This includes private, governmental, and international expenditures. Panama has a mixed system of care delivered through several government agencies and a private health sector. No data are available to compute the direct costs for any disease to various sectors or within any one sector providing care. The only figures which can be used are Ministry of Health budget expenditures allocated to categorical disease problems. Although these budget allocations include some prevention funds, they understate the total direct costs as they exclude other government and private expenditures.

2. The indirect costs of lost wages and lost productivity:

   These estimates recognize that when a worker is ill enough to be reported as a disease case to the health authorities, he is not working and is, therefore, not receiving his normal salary. While it is possible that he receives some payments from insurance of the government, i.e., Social Security, he is not producing, and his lost productivity can be counted in terms of his equivalent lost wages.

   The many possible costs of lost wages and lost productivity are derived by combining various assumptions regarding the nature of a specific disease and the characteristics of the working population. These assumptions include a minimum daily wage of $2.00; varying periods of disability; work weeks of five or six days; and a working population discounting female labor or equating female labor. Because there are no specific data available for the number in the working population with a given disease, the number of cases is estimated by various techniques explained in the Appendix.

3. The indirect costs attributed to increased caloric needs of all the population, working and nonworking:

   These cost estimates are derived from the model developed by Sheldon and Pollack for the Institute for Defense Analyses (IDA). The model recognizes that febrile illnesses accelerate the metabolism and thereby exert a caloric demand which must be replaced eventually by increased food consumption. This caloric increment attributable to the disease process requires food that is essentially wasted. The costs of the caloric increment can be assessed in term of the food in three different ways--the number of persons it could feed if reallocated, the number of working days required for its production, or its value in the market place. (Tables 20 and 21)

   The number of persons to whom the food could be reallocated is based on a daily minimum diet of 2,400 calories. For each, an average annual caloric increment per case is calculated. The caloric increment per case multiplied by the number of cases gives the total annual caloric increment for the disease. This increment is then expressed in terms of the number of man-days of full nutrition it could have provided. A man-day of full nutrition is defined as a day in which 2,400 calories are made available to one man. Alternatively, the annual caloric increment can be expressed as man-days of labor-increment nutrition. Labor-increment nutrition represents the caloric difference between full nutrition (2,400 calories) and

nutrition sufficient only for basal metabolism (2,000 calories). This difference of 400 calories theoretically can convert a person at subsistence level (2,000 calories) to a worker (2,400 calories) and corresponds to the number of calories of saleable labor per person per day.

The number of working days required for the production of the food wasted by disease is figured in terms of the calories expended by the food producer. This is based upon an input-output caloric conversion ratio of 1 to 16. It is calculated in terms of wasted man-days of labor-increment nutrition, assuming that each worker has only 400 calories per day for sale. From the viewpoint of the worker, this is not wasted labor, for he has produced a marketable product from which he receives his livelihood. From the viewpoint of society, the man-days of labor that are leeched from an already poorly nourished society produce food which is not effectively utilized for progress and development, but is instead essentially wasted.

The market value of the total annual caloric increase for each disease can be figured in terms of the prices of the food staples of rice, corn, and wheat required to meet the caloric demand. However, these costs are misleading as they represent satisfaction of caloric food needs through the application of the cheapest staples without regard to the quality and composition of the usual diet. The more realistic market value of the food is based upon the minimal balanced diet. The Ministry of Health estimates the cost of this diet to be approximately 50 cents per person per day.

In the narrowest sense, the real caloric costs of disease are limited to the market value of the food. However, to a society with limited resources the other caloric costs represent the greater costs of lost opportunity.

4. <u>The indirect costs attributed to loss of potential earnings because of premature death</u>:

These economic losses have been estimated primarily for illustration and are presented to reflect the potential wealth that might have been generated had the preventable deaths been averted. These losses are based on minimal assumption of performance using the minimal salary of $2.00 a day for 312 days per year. Their net worth discounted to present value of the labor has not been calculated for this purpose. These costs are based only upon the male population over age 15 and under age 60.

The costs are based upon the assumption that male life expectancy in Panama is 60 years, and had death from a given disease not occured to the group of males ages 15 to 59 in a given year, the group on the average would have reached the life expectancy of 60 years. Using the age and sex distribution of deaths from a given disease in Panama, it is possible to estimate the number of years of life lost because of premature death from the disease and to calculate from this the loss of potential earnings.

5. <u>The indirect costs attributed to investment in inidividuals who die as a result of the disease:</u>

This includes government investments in education, childhood medical care, and other programs identified as directed at children, e.g.,school lunch programs, and represents wasted investments. Nongovernmental and private expenditures for the care, education, and raising of nonproductive individuals also should be included. The expected benefits of these expenditures are not realized when premature death occurs. For this reason these costs are mentioned here to illustrate a "waste" of the society's efforts. Because data are not available to estimate the magnitude of this investment, these costs are calculated for individual diseases.

6. <u>The indirect costs to the government through Social Security payments:</u>

The Social Security Fund is supported by compulsory contributions from the employee, the employer, and the government. (The amount of support from each is given in

Table 22.) Self-employed persons may choose to contribute. Payments made to the sick through this fund are estimated to illustrate the impact a given disease has upon a specific government organization and upon the workers and employers who support it. These costs are not included in the totals for the cost of the disease because they represent a portion of the costs of lost wages. Costs of disease to the Social Security Fund are based upon the assumption that the proportion of cases with a disease in the working-age population can be applied to the working-age population with Social Security coverage. For Panama, an analysis of the available data suggests that essentially all nonagricultural workers are included in the Social Security System. Sixty percent of the working population are nonagricultural workers. Therefore, the number of persons with a disease who receive Social Security payments is assumed to be 60% of those in the working-age population with the disease. For certain diseases which tend to be more prevalent in the urban, industrial population rather than the rural, agricultural population, the costs figured here are extremely conservative.

Sickness payments amount to 60% of the worker's salary for the first year of the illness. (Payment after the first year are described in Table 22.) Using the average weekly non-agricultural wage of $23.00, the costs of a disease to the Social Security Fund are estimated with varying numbers of cases and lengths of disability. The remaining 40% of the worker's salary is a loss to the worker.

Only payment for sickness has been estimated here. It would also be possible to figure payments to survivors due to the death of the worker from the disease. More accurate costs of a disease to the Social Security System could be calculated using information from records of payments to individuals with the disease. Such costs could be of great use to the Social Security Fund to realize which specific diseases place the largest burden upon the system.

Where appropriate, these various costs are calculated for tuberculosis, enteric infections, and malaria. Using tuberculosis as a model, the method for calculation of selected costs is presented in more detail in the Appendix. The costs of lost wages, caloric needs, and lost potential earnings are given special consideration as they represent significant monetary losses that are often overlooked or never considered. The available information for each of the three diseases varies greatly, hence the differences in detailed calculations of the costs of each disease. The purpose here is not to determine which of these diseases is more deserving of attention. Rather, utilizing very limited information, the purpose is to demonstrate the impact disease has on the society, using these three diseases as examples. The calculations are presented as follows:

Cost of Tuberculosis

The direct costs of care:

Direct costs for the treatment of tuberculosis may be incurred by the government, the individual international agencies, or other governments. For Panama, however, the only direct costs for tuberculosis which can be estimated are those costs from government allocated funds. Costs from other sectors are not specifically identifiable for the disease. These figures certainly understate the costs of care for this disease. Although PAHO/WHO had no tuberculosis expenditures during 1968 and no funds budgeted for 1969, other programs which they supported may have been involved in some phase of prevention and cure of the disease. The same may apply to the Agency for International Development, which also had no expenditures specifically directed to tuberculosis.

Government figures for expenditures on tuberculosis are not identified in categories of prevention, diagnosis, and treatment; therefore, only total figures can be presented. The amount spent by the Ministry of Health on tuberculosis in 1969 was $1,000,940, and the estimates for 1970 and 1971, respectively, are $1,020,959 and $1,097,531. The expenditures amount to approximately 73¢ per capita.

Indirect costs of lost wages and lost productivity:

These estimates are based upon calculations of cases of tuberculosis in the working-age

population, assuming varying disability periods (90,180,365 days) resulting in wage loss and estimating the value of labor for males and females according to varying wage scales. The minimal estimate (an extremely conservative estimate of the value of lost wages) is based upon the shortest disability period, the shortest work week (5 days), and the lowest number of cases, discounting unpaid female labor. The value of this estimate is 627 man-years (of 365 days), or approximately $440,000. The estimate is not really representative of the Panamanian society and truly understates the value of the labor lost. A more reasonable, yet conservative, estimate of disability period, work hours, and value of labor places the value of lost wages between $1.5 to $1.7 million annually, based upon data for 1966. (The many possibilities of these costs are presented in detail in Tables 23a and b.)

Indirect costs attributed to increased caloric needs of all the population, working and nonworking:

The caloric needs reflect the needs for basal metabolism plus an increment attributed to fever and the disease process. The cost of this caloric increment is expressed in terms of the excess food required to meet the increased caloric needs of the sick. The food value is assessed in three different ways: in terms of the number of persons it could feed if reallocated, the number of working days required for its production, or its market value.

For tuberculosis, the food reallocation cost is 173,400 calories per case per year based upon an average annual increment of 19.8% of 2,400 calorie daily nutrition for 365 days. This value of 173,400 calories is sufficient to provide 72 man-days of full nutrition (2,400 calories) per case per year or 434 man-days of labor-increment nutrition (400 calories) per case per year. For the 8,722 cases of tuberculosis in 1968, the total excess annual caloric consumption is approximately 1.5 billion calories, enough to provide full nutrition to more than 10,000 persons for two months.

The number of working days required for the production of this excess of caloric consumption is based on an input-output ratio of 1 to 16. Approximately 11,000 work calories are invested by the labor force to produce the 173,400 calories of food consumed by each tuberculosis patient annually.

Since each worker is assumed to have only 400 calories per day for sale, each case requires 27.5 days of this saleable labor per year. For the total 8,722 cases of tuberculosis, 240,000 man-days of labor are expended in the production of the excess calories. Again, it must emphasized that this is not wasted labor from the viewpoint of the laborer, but from the viewpoint of the society, the food the laborer has produced is essentially wasted.

The market value of the 1.5 billion calories expressed in terms of the cheapest staples equals approximately $22,000 for corn or approximately $50,000 for paddy rice. Food cost estimates based upon a balanced diet are considerably higher. Using the estimated daily dietary cost in Panama City of approximately 50 cents per person, the excess food costs for the tuberculosis patient is approximately $36 per year. For the 8,722 patients in 1968, the total excess food costs to the ill were approximately $314,000.

Restated, the minimal caloric costs of tuberculosis is $314,000 per year. The food that is wasted consumes 240,000 man-days for its production and would be enough to feed 10,000 persons for two months.

Indirect costs attributed to loss of potential earnings because of premature death:

In 1966, there were 195 male deaths from respiratory tuberculosis in the age groups 15 to 59. Assuming male life expectancy to be 50 years, a total of 1,440 years of productive life were lost. The potential earnings lost from that year alone based on a minimal salary of $2.00 a day and a six-day work week equal $900,360. (Table 24)

The assumption that the group would have reached life expectancy had they not experienced tuberculosis is particularly important. Although it is recognized that the man who contracts and eventually dies from tuberculosis may belong to a more susceptible population, the data are not sufficiently precise for us to deal with this problem. In Panama, of the ten leading causes of death among those ages 15 to 64, the only communicable disease cause is tuberculosis and other respiratory diseases. (Tables 11d,e)

The other causes are primarily accidents, malignant neoplasms, and heart disease. There is no reason to believe that those with a high susceptibility to communicable disease are necessarily at higher risk from the noncommunicable diseases as compared with the remainder of the population of the same age.

Because the calculations of lost potential earnings include only males for the one year and are based on the minimal wage, they understate the real cost incurred when premature death occurs.

The indirect costs to the government through Social Security payments:

Social Security payments for sickness are calculated using varying estimates of numbers of cases and differing periods of disability. These possible costs are presented in Table 25. The minimum cost to the Social Security Fund is $360,696, based on only 2,147 cases with a duration of 12 weeks each. Less conservative assumptions of more cases and longer durations produce costs to the Social Security Fund of over $3,000,000. Using even the less conservative assumptions, the estimates of the cost of tuberculosis to the Social Security Fund understate the case. The estimates are based on the assumption that the disease is distributed evenly throughout the agricultural and nonagricultural populations. For tuberculosis, this is probably not the case, as the disease tends to be more prevalent in nonagricultural workers. The high population density in the worker and social environments of the cities facilitates the spread of the disease.

Tuberculosis is a major problem for Panama. In 1968, it ranked eighth among all causes of death and third in communicable disease. In the working-age population, it is the second ranking cause of death. In sheer numbers, in 1968, it accounted for 285 deaths, of which 216 were medically certified. In addition, there were 8,722 reported cases of pulmonary tubercular reinfection and 260 cases of extra-pulmonary infections.

Experience suggests that reported disease is far below actual disease load within the community. Considering only reported data, almost 9,000 persons experience febrile episodes that remove them from work activities for at least 90 days in the year. If this period coincides with planting or harvesting time for the farmer, it could mean a significantly diminished or lost crop. Since there are two planting and harvesting seasons in Panama, the probability of such an occurrence is exceedingly high. The impact of lost crops on a society with an already limited food supply extends the burden of the disease beyond the patient to the community.

The costs of tuberculosis are high for Panama. The Republic currently allocates approximately $1.0 million to the prevention, diagnosis, and treatment of the disease. The indirect costs as expressed above total from a minimum estimate of $1.7 million to a moderate estimate of $3.0 million. These figures exclude the costs of investments in individuals who suffer premature death and the costs to the Social Security system. Ignoring the problem of the disease or treating it only superficially results not only in human suffering but a significant loss of economic resources. A small incremental investment in prevention and treatment may yield a net economic benefit to the society.

Cost of Enteric Infections:

Direct costs of care:

No data are available reporting these costs. Annual reported cases approximate 1000 and a selected group of institutions ascribe 1400 hospitalizations and 12,700 medical

consultations to enteric infections. If information were available which presented * the cost of a unit of medical consultation or the cost of hospitalization, some estimate of the direct costs of this disease problem could be made. From even the limited data, it is apparent that the treatment of enteric infections consumes a major portion of medical time.

Indirect costs of lost wages and lost productivity:

Estimates of the working-age population with reported cases of dysentery approximate 475 cases annually. (Tables 1 and 13) Presumably, reported cases represent infections of sufficient duration and severity that the patient was unable to work and sought medical advice. In a country with a high prevalence of enteric infections, several days will have elapsed before medical consultation is sought, as some enteritis is self-limited. Once medical consultation is obtained, more time will elapse before the condition is sufficiently under control such that work can be resumed. It is estimated that this process takes about ten working days.

Costs based upon the lowest wage and hour estimates for a ten-day disability equal approximately $10,000 in lost wages. These costs are not impressively high because of understatement through underreporting of cases, and primarily because much of the adult population is less susceptible to the major episodes, which are those reported.

Indirect costs attributed to increased caloric needs of the population, working and non-working:

These costs are expressed in terms of the excess food required to meet the increased caloric needs of the sick. This food value is assessed as the number of persons it could feed if reallocated, the number of working days required for its production, or its value in the market place.

For the enteric infections, the food cost is 49,900 calories per case per year based upon an average annual increment of 5.7% of 2400 calorie daily nutrition for 365 days. If reallocated, this value of 49,900 calories is sufficient to provide 21 man-days of full nutrition per case year or 126 man-days of labor increment nutrition per case per year. If the 12,700 consultations represent cases, the total excess annual caloric consumption approximates 634 million calories, enough to provide full nutrition to approximately 4,500 persons for two months.

The number of working days required for the production of this excess caloric consumption is based on the input-output ratio of 1 to 16 and assumes that each worker has only 400 calories per day for sale. For the enteric infections, each case requires 7.5 days of this saleable labor per year, and the total cases require 95,250 days per year.

The market value of the 634 million calories expressed in terms of the minimal balanced diet is $133,350.

The indirect costs attributed to loss of potential earnings because of premature death and the indirect costs to the government through Social Security payment have not been figured here. They could have been derived using the method applied for the costs of tuberculosis. The indirect costs attributed to investment by the society in the individual have not been figured as the necessary data is not available. Because the majority of the deaths from enteric infections occur in those under 15, the costs of wasted investments would be very high. The only costs of the enteric infections presented here are the indirect costs of lost wages and increased caloric needs. This amounts to $143,350 for a given year. The costs of lost wages are given for the enteric infections to demonstrate the impact of the diseases on the working population and their families. The costs of increased caloric consumption show the effect of the disease on the community as a whole.

The figure of $143,350 certainly understates the problem of the enteric infections. This group of diseases is responsible not only for a large portion of the deaths

* A simplified cost-benefit scheme is presented in the Appendix.

especially in the child population, but also contributes to a vast unnumbered sick population. The diseases aggravate malnutrition, especially protein deficiency, because of poor absorption and excess losses. In children, the combination of protein-calorie deficit, enteritis, and other infectious diseases is highly lethal as demonstrated by the mortality patterns in this group.

Cost of Malaria:

Direct costs of diagnosis and care:

A malaria eradication program operated by the National Malaria Eradication Program (SNEM) is one of the major undertakings of the Ministry of Health. Financing is provided by the government of Panama, USAID, UNICEF, and PAHO. For the period 1969-1971, AID's commitment is $1,430,000, 32% of the estimated cost for that period. The Government will provide $2,228,730, or 51%, and the remaining 17 percent will come from UNICEF and PAHO. The National Malaria Eradication Program will provide necessary strengthening of administrative procedures, training of technical personnel in all categories (supervisors, house spraying personnel, sanitary inspectors, assistant entomologists, health educators), an extensive intradomiciliary spraying program using residual insecticide, and epidemiologic surveillance through continuous monitoring of blood smears in the field. The projected total cost of the program is $4,400,000.

Indirect costs of lost wages and lost productivity:

As described in detail in the Appendix, certain assumptions must be made to generate the cost estimates presented here. It is assumed that a case of malaria is equivalent to a series of thirty febrile paroxysms during a time period of ten to twelve weeks. The number of cases is estimated at 1471 in the working age population. At the minimum wage, for the shortest work week, with female value equivalent to males, the wage loss is approximately $60,800 annually. If female labor is discounted to include only those women who are salaried, the estimate is reduced to an absolute minimum of $36,500.

Indirect costs attributed to increased caloric needs of all the population, working and nonworking:

For malaria, the food reallocation cost is 71,800 calories per case per year based upon an average annual increment of 8.2% of 2400 calorie daily nutrition for 365 days. This value of 71,800 calories is sufficient to provide 30 man-days of labor-increment nutrition per case per year. For the reported 3000 cases of malaria annually, the total excess annual caloric consumption is approximately 215 million calories, enough to provide full nutrition to 3,000 persons for one month. The number of working days required for the production of this excess calorie consumption is based on the input-output ratio of one to sixteen. Approximately 4500 work calories are invested by the work force annually to produce the 71,800 calories of food consumed by each malaria patient in a year. In terms of saleable labor, each case of malaria requires 14 man-days. For the total 300 cases, 42,000 man-days of labor are expended in the production of the excess calories.

For each patient, the cost of the excess calories based on the minimal daily diet is 50 cents per person per day. For all cases, the total excess food costs to the ill are approximately $45,000.

The indirect costs of lost wages due to premature death and the indirect costs attributed to investment by the society in the individual have not been estimated because of the relatively small number of deaths. The indirect costs to the government through Social Security payments also have not been estimated for malaria. The same method used for tuberculosis could be applied.

The impact of malaria is more difficult to assess because active control/eradication programs have been conducted since 1947. The direct costs of the malaria eradication program amount to $4.4 million. The indirect costs, which include only the costs of lost wages and increased caloric needs, range from a minimum of $81,500 to a still

conservative $105,800. Because the indirect costs are so low compared to the direct costs, the problem might be considered by some not to warrant the high outlays for a continuing malaria program. On the contary, if the estimates used the prevalence rates prior to the eradication program, the annual costs would be five or six times greater. The considerable savings already realized from the malaria programs should encourage future efforts.

Winslow has given a number of examples of the impact of malaria control programs upon resource consumption and productivity:

1. Philippines - in 1946 school absenteeism ran 40-50% daily, and industrial absenteeism of 35% required excess hiring of this amount. Both situations were atrributed to malaria. By 1949, after institution of malaria eradication, school absenteeism had dropped to approximately 3% daily and industrial absenteeism from all causes to 2-4%. In addition, individual worker output increased an estimated 20%.

2. Greece (1950 data) - spraying with DDT in a survey area reduced malaria to an extent that crop production rose 20-30%. Before the war, Greece spent approximately $1.3 million for quinine, but in 1950, the cost of DDT for spraying was only $300,000.

3. Pakistan - in an Eastern Bengal area, one season of work on malaria control was reported to have increased the rice crop yield by 15%.

4. Other virtually uninhabitable areas of the world have been opened and become exceedingly productive because of malaria control: The Transvaal, Sardinia, and Ceylon. This success in some areas has allowed the exploitation of new land with increased productivity. In Panama, large areas have remained undeveloped because of malaria. This illustrates the interdependence between public health planning and programming and socio-economic planning.

Effective malaria activity can increase individual worker productivity and total agricultural output in the range of 20-30% and certainly by at least 10%; by decreasing absenteeism it can increase the total number of workers available by roughly one-third in the highly malarious areas; it can greatly increase the number of children in school and affect overall population growth through alteration of the death rate, particularly in the young; and it can open up whole new areas for agricultural or industrial development in Panama.

NUTRITION

Good nutrition is basic to health. In the infant and the growing child, demands for adequate calories and vitamins, and especially the needs for high quality protein, must be met first for survival and then for realization of both physical and mental potential. In the adult, nutritional status relates to resistance to disease and to the level of productivity.

In Panama, the health status of the population is affected significantly by the prevalent malnutrition. Children and adults experience the result of poor nutrition, and the development of the economy is ultimately altered.

Nutritional Status of the Population

Many Panamanian families have little knowledge of what constitutes good nutrition and its importance for good health. The emphasis is naturally on filling stomachs rather than on a balanced diet. Children's food needs are subordinated to those of the workers. Necessarily, the result of this is seen in the high malnutrition rate of children. Not only are some foods not available, but other foods are avoided although they are obviously nutritious. For example, fish are rarely eaten inland, apparently because in the past fish spoiled by the time they were transported from the coast.

The result of these factors is a generally poor nutritional status. Tables 26a and b present data on the estimated per capita availability of nutriments for the rural areas (by sanitary regions) for Panama City. The data from Panama City were drawn from a household survey of 96 families. In both tables, the deficits of calcium and riboflavin for the whole population are obvious as well as a major deficit in vitamin A in the rural areas.

The impression derived from these data is that malnutrition is not a major problem because of the seeming adequacy of calories, proteins, and most vitamins. However, the 1970 Nutrition Report of the Ministry of Health of the Republic states that approximately 15% of the population consumes less than 70% of the minimum amounts of proteins, calories, and vitamins necessary for proper growth, development, and productivity. This means that approximately one person in six in Panama is malnourished. Further evidence is seen in clinical manifestations of poor nutrition. Five percent of the people in urban areas and 7% in rural areas had frank anemia, attributed primarily to iron and folate deficiency. Endemic goiter had a country-wide prevalence of 16.5% indicating an inadequate intake of iodine. With the exceptions of Bocas del Toro and Colon, all provinces exceeded the 10% level defined by PAHO as a major goiter problem.

The prevalence of protein-calorie malnutrition among children under five years of age was estimated at 60.7% in 1965, or 126,000 out of a possible 208,000. Data comparing the nutritional status of Panamanian children with children in other Central American countries are presented in Table 26. The impact of malnutrition upon Panamanian children is shown in the height and weight graphs, Illustrations 4 and 5. After one year of age, Panamanian children are retarded in height as compared to the INCAP standard. By five years of age, this height retardation equals approximately one year. The weight retardation is even more striking--the six-year-old Panamanian child is approximately the same weight as the four-year-old child on the INCAP standard.

The observation that weight retardation is more pronounced than height retardation suggests that caloric deficit in children is even more severe than protein deficit. This remains as yet unverified.

Nutrition and Work Productivity

Winslow cites studies in the mines of the Ruhr which showed an increase in manual labor productivity of 50% above the starting level when the diet was changed from a minimal level to one designed for workers in heavy industry. In addition to increased productivity with improved diet, body weight increased moderately during the year. Another study in the Ruhr related output to caloric intake as follows:

Work calories allotted*	Ton of coal mined/day/man	Work calories per ton	Change in body weight
1200	7	170	basal
1600	9.6	155	loss
2000	10	200	normal

During the construction of the Pan-American Highway, there was considerable dissatisfaction with the productivity of Central American labor forces. Contractors felt that production was low simply because the laborers were unwilling to work. However, when three well-balanced meals were provided, the average weight of the laborers increased 10-15 pounds within a few months, and production (laying of concrete) rose from 1.8 to 5.9 cubic yards/man/day, an increase of 230%. It was felt that the dietary inadequacies of this population related directly to the lack of transportation needed to make food production practicable and profitable. Correction of the nutritional deficits allowed construction of a road, which allowed the

(* in addition to 1600 calories for basal metabolism. This experience was confirmed on a large scale in the mines with the observation that whenever the dietary allowance fell, production also fell, and when the diet was increased, production increased.)

development of a food-growing industry, the building of more roads, and the opportunities for further development.

Where calorie supply is marginal, starvation may not be obvious, but malnutrition can be detected. The available calorie supply may meet the needs of survival but prove to be inadequate to provide sufficient physical manpower to allow development and fight disease. Death rates from a variety of diseases have been significantly lowered as a direct result of some change in diet. Enrichment of flour in Newfoundland is considered to be largely responsible for a drop in the general death rate by 10%, in the tuberculosis rate by 25%, and in the infant mortality rate by 40% during the period 1944-1950. The enrichment of staple flours such as rice has been largely responsible for the virtual disappearance of certain nutritional deficiency diseases such as beri-beri.

Good nutritional status is critical to the development of a productive, healthy labor force and population. Accordingly, it is necessary to consider the causative factors in malnutrition. Sheldon and Pollack suggest the following differentiation:

> Primary malnutrition is the result of inadequate food intake to meet normal demands. In this situation there is a compensating mechanism which develops and which slows metabolism to allow the starving individual to come into a new equilibrium at the diminished food intake level.... Secondary malnutrition is seen when the metabolic processes are increased by disease or trauma. Under these conditions compensatory mechanisms cannot be evoked. During the acute and subacute phases of the disease process, it is virtually impossible to achieve a retention of protein by the body even by the use of hypercaloric and very high protein intake.

Activities which seek to increase the production, improve the distribution, and provide for improved quality of food are directed mainly at solving the problems of primary malnutrition. Such activities will have less benefit for those whose malnutrition is caused by disease processes, especially tuberculosis, dysenteries, intestinal parasitism, and malaria. The secondary malnutrition caused by diseases is best corrected by prevention and the treatment of the underlying disease process while simultaneously correcting the dietary deficiency.

Primary malnutrition results from a food supply inadequate to the needs of the body. In Panama, this occurs partly because total production of nutritionally required foods is insufficient. Partly, however, this malnutrition is due to a number of socio-economic factors which hinder adequate distribution and consumption of food. Some of these factors include inadequate knowledge about nutrition, poor means of good storage, insufficient transportation systems, undeveloped local markets, and low purchasing power.

Agricultural Production

One reason for insufficient agricultural production is that not enough of the potential agricultural land has been used. Various studies differ in estimating land which might be used for agriculture. Only 3% of total land area is now under cultivation. At least an additional 12% is lying fallow or in pasture land and could be reclaimed. Although cultivated soil is not especially fertile, production could be raised by developing lands not currently in use, or by improving land now in use.

Agricultural output can be significantly increased by development of new strains of crops and by improved agricultural practices. This has been responsible for the dramatic increase in banana production in the last four years. However, the advances which appear so dramatic in production figures are less impressive in the face of rapid population growth. Illustration 6 presents indices of total and per capita agricultural production for Panama for the years 1952-1967 (adjusted to the base 1952-1956 equals 100). Although there has been an 85% increase in agricultural production, the per capita increase has been just over 20%, and most of that has come in the last four years. In fact, there were several years in which per capita production dropped.

The illustration also compares indices of total and per capita agricultural production and food production for the same period. The similarity of the graphs indicates that almost all agricultural production is food as opposed to cash crops. It is important to remember that these are production figures and do not reflect actual food consumption.

Total and per capita production figures give only a rough idea of the adequacy of food production for nutritional needs. A more accurate appraisal for Panama is given in Table 28a. This table presents national production figures for the year 1965 according to major categories of food and compares them with the estimated demand for each category based on minimal nutritional needs. In that year, national production of high-protein foods--milk, eggs, meat, beans, and vegetables--met only 60% of national nutritional needs. Production of grains, tubers, and fruits met less than 90% of needs. Only corn, bananas, and raw sugar exceeded nutritional requirements, and the latter two products were partly produced for export. In short, Panamanian food production is inadequate to meet the minimum nutritional requirements of the population. Tables 28b,c and d (which project food production and population estimates for the years 1970, 1975, and 1980) indicate that increases in agricultural production will be largely offset by rising population.

Barriers to Consumption

Not only is total food production inadequate for the nutritional needs of the Panamanian population, but a number of social and economic factors interfere with the optimal distribution and consumption of the food that is produced.

Lack of adequate transportation is a barrier to both production and distribution of an adequate food supply. Before completion of the Pan-American Highway through Costa Rica, the driving of beef cattle from grazing lands to San Jose resulted in a 40% loss of weight. As a result, beef had to be imported in order to satisfy domestic demand. When the highway was completed, cattle could be shipped overnight by truck to San Jose, thus eliminating the weight loss and meeting the domestic need so that importation could be stopped. Until Panama builds adequate roads, foods necessary for balanced nutrition will be unavailable in many areas of the country.

Economic considerations also affect nutritional status. Many Panamanians are unable to purchase necessary foods. For most people living in a money economy or aware of the power of money while living in a more traditional economy, economic values can alter the diet pattern by altering the choices of food. Certain generalizations can be put forth.

(1) As income increases, the family gradually restructures its diet.

(2) This restructuring occurs within the context of a dietary heritage and within ecologic constraints.

(3) The rate of change depends upon the rate of change of per capita income, the availability of a variety of food choices, and other demands placed upon the available, now disposable income.

(4) As income increases, the dietary trend is roughly as follows: marked increase in consumption of fats and sugar with moderate increase in animal protein; marked decrease in starches and vegetable fats and moderate decrease in vegetable proteins.

Because of their economic value, Panama also exports many foods which could be used to improve the nutritional status of the population. While diets are lacking in eggs, 18 metric tons of eggs are being exported at almost half the unit price at which 40 metric tons are being imported. This may, however, be at least partly explained by a lack of eggs during certain seasons, thus the necessity to import eggs at a cost increased by import taxes, transportation costs, and higher foreign production costs. Economic experts (CIAP) have suggested that Panama export livestock, although there is a deficiency in meat diets. * Part of the reason for these export practices may be that domestic demand for these products may be much less than necessary for adequate nutrition simply because many Panamanians cannot afford to buy them. For example, bananas and shrimp would both be welcome additions to

* The proposed markets for these livestock exports are not identified.

Panamanian diets, but their value as exports is too great.

Agricultural Goals for Nutrition

Thus, Panama suffers not only from shortages in total agricultural production but also from the underproduction of foods with the highest nutritional values. Many nutritious foods produced are exported. These problems are compounded by lack of transportation, lack of purchasing power, and poor understanding of proper nutrition. Not only does agricultural production have to meet the nutritional needs of a rising poulation, but it also has to provide produce for exports to overcome an unfavorable balance of trade. The task of setting agricultural goals within these constraints is difficult but hopefully not impossible.

For example, according to data from Table 28a, corn production amounts to approximately 354% of Panama's recommended need, while bean production is only 52% of the recommended intake. Corn has become the dietary staple because of its availability and relatively low price. Thus, demand has risen and an agricultural goal of eliminating the small amount of imports and becoming "self-sufficient in corn" has been set and reached within the past four years, while in reality corn is overproduced as compared to optimal nutritional standards.

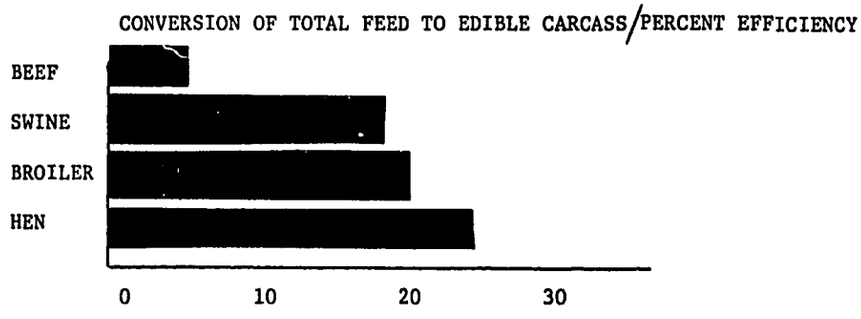
Assuming that area under cultivation remains the same, that average yield per acre remains the same and that acre for acre corn cultivation can be converted to edible dry bean cultivation, some major changes could be produced. Using 1965 data from Tables 29a and b, if corn production is reduced to 100% of nutritional need, land used for corn production would drop from 105,000 hectares to approximately 28,000 hectares. This leaves approximately 77,000 hectares for agricultural development. To increase bean production from 52% of nutritional need to 100%, it would be necessary to increase land under bean cultivation from 15,000 hectares to 28,000 hectares, leaving 49,000 hectares of the 77,000 hectares still available for other use.

The impact of such a program would be considerable. Corn and bean production would then meet 100% of the nutritional need for those foods. Savings on imports of beans alone would run between $685,000 and $900,000 annually--corn valued at $190,000 was imported in 1965, but none has been imported since that time. The nutritional value of the diet would be enhanced because beans have approximately twice the protein values of corn, and beans are highly acceptable as a staple within the diet.

In addition, 49,000 hectares are freed for other agricultural use. They could continue to be used for corn production or could be converted to bean production for export. Based upon 1965 import costs ($210/metric ton for beans and $82/metric ton for corn) beans are approximately 2 1/2 times as valuable a crop as corn. Even if corn in excess of the 100% level were desired, it might be more profitable to raise beans for export and to import corn. The 49,000 hectares could also be used to raise other vegetables so that their production might reach the 100% level. This might, however, require a better transportation system so that the vegetables would not spoil on their way to markets.

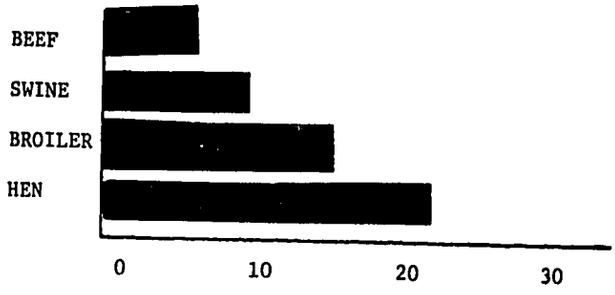
Another alternative might be the raising of animal feed grains, possibly even corn, to facilitate the production of meat sources.

Swine and poultry have a relatively high conversion efficiency of total feed to edible carcass and of ingested protein to edible protein as suggest in the illustration below:



PERCENT EFFICIENCY

CONVERSION OF PROTEIN INGESTED TO EDIBLE PROTEIN



Raising of chickens is already widespread in Panama. Chickens are a valuable source of meat in a tropical country without widespread refrigeration facilities and without an extensive transportation system.

In addition, the size of poultry is appropriate for family meals; poultry can be killed immediately before cooking so that there is little waste and spoilage, and poultry require relatively little room for care. An agricultural planner familiar with the climatic and soil conditions and technology of various regions could combine agriculture and nutrition by using data as in Illustration 11, which presents a comparison of the relative efficiency of protein production per acre by a moderately active man for selected agricultural food products.

Thus, it seems possible that agricultural goals in Panama could be altered to reflect the basic protein-calorie needs of the country.

PART TWO

IDENTIFICATION OF RESOURCES

OBSERVED HEALTH CARE RECEIPT

Receipt of health care is probably best determined through a mass survey and examination procedure. Since this is not possible here, various sets of data are used to estimate the extent and availability of medical care received by the population. Data on medical certification of deaths are used to relate the availability of care at the time of death to the availability of care at the time of illness. These data are also used to determine which members of the population receive some care and to what extent this receipt of care is influenced by severity or duration of illness. Services delivered to special segments of the population are also used to assess the general availability of medical care. These data are also compared with those derived from maternal and child health services. Finally, information on immunization is used to ascertain to what degree routine, simple methods of prevention are available to the population, to suggest the theoretical excess of a disease that exists when these methods are not employed, and thereby to assess the unnecessary burden on already limited health services.

Data from Medical Certification

In 1968, approximately 55% of all reported deaths were medically certified. These data, presented in detail in Tables 30 and 31 are summarized below:

	Number	Percentage
1968 Total Deaths in the Republic of Panama (provisional figures)	9,849	100
with medical certification	5,443	55.3
without medical certification	4,406	44.7
1968 Total Urban Deaths	3,743	100
with medical certification	3,564	95.2
without medical certification	179	4.8
1968 Total Rural Deaths	6,106	100
with medical certification	1,879	30.8
without medical certification	4,227	69.2

These data show that 95.2% of all deaths in urban areas, but only 30.8% of deaths in rural areas, are medically certified. This means that 96% of all non-certified deaths occur in rural areas. In the absence of specific information, certification of death is interpreted to mean that registry of death carried the signature of a physician who was in attendance at, or shortly before or after, the time of death. If this assumption is correct, then approximately 70% of those dying in the rural areas (43% of all those dying in the Republic) are not seen at or near the time of death by a physician, thus, a major proportion of the population does not receive medical care at the time of death, particularly in the rural areas. It is reasonable to infer that some of these deaths might have been prevented or life significantly extended.

To obtain some further insight into the problems of availability of medical care, an analysis has been made of data presenting causes of death. Those with rapidly-evolving, severe illnesses are at greater risk of dying without benefit of medical care. This was discussed in the section on mortality data of Part One. With a rapidly-evolving disease, such as tetanus, only 50% of the deaths were medically certified, while with a more chronic disease such as tuberculosis, 75% of the deaths were medically certified. This signifies that at least half of those victims of the more rapidly-evolving disease died before they were able to receive medical attention. With a disease of longer duration, a greater percentage of the patients were able to be seen by a medical person at least before death. Apparently care is not readily available to a large portion of the population and, in addition, the sick may

not seek care until they experience a disease of some duration or severity.

Since a significant segment of the population does not receive medical care at the time of death, a similar proportion may also not be receiving medical care when acutely ill. Data in Table 31 indicate that 20% of all deaths are ascribed to obscure causes ("symptoms and morbid states ill-defined"). Analysis indicates that these deaths occur in rural areas. In most non-certified deaths, a member of the family makes the report and suggests a cause. Had the illness ever been medically diagnosed, the reporter would probably have some idea as to the specific cause of death. At least one-fifth of those dying in the rural areas have disease so ill-defined and probably undiagnosed and untreated at any time that not even a lay name is used for the cause of death. Furthermore, an additional fifty percent of rural deaths are not medically certified, so that there is only lay reporting as to the cause of death. This suggests that this group of patients may or may not have had some recent medical care, but probably none at the time of death.

These considerations are presented as follows:

Distribution of Care at Time of Death in Rural Areas

70% Deaths Not Medically Certified	20% Ill-Defined and Obscure Cause of Death	20%	Presumably No Death Related Medical Care
	50% Lay - Reporting As To Cause of Death	50%	May or May Not Have Had Some Recent Medical Care But Probably None At Death
30% Deaths Medically	30% Medical Certification As To Cause of Death	30%	Probably Some Medical Care Available At Time of Death

From these data, it may be possible to extrapolate the availability and accessibility of health care to the rural ill. If 20% of the rural population suffers eventual fatal disease that may never have been diagnosed by a physician, then this group may be representat' e of a 20% sample of the ill populaltion also not receiving diagnosis or treatment. If 50% of the persons dying in rural areas have had sufficient medical attention to allow for even a crude determination of the cause of death to be cited by a lay person, but no medical attendance at the time of death, perhaps this group is representative of a 50% sample of the sick who have only sufficient medical care to identify problems without adequate, definitive treatment at the time of acute illness.

This concept may be presented as follows:

Assumed Distribution of Medical Care in Rural Areas

20%	--No care or very little care
50%	--Limited Care available
30%	--Possible regular preventive or therapeutic care

The assumption that a range of 20 to 70% of the rural population receives little or no care is further supported by the data reported for three special categories of the population: pregnant women, infants under one year, and children age one to four years. National data from hospitalizations and medical consultations (cited in a previous section) show that in 1965 only 40% of pregnant women and 75% of infants under one year were seen through the available Maternal and Child Health services. Only 50% of the children aged one to four years were seen at least once annually. This means that from 25 to 60% of certain population groups did not receive even simple, routine care.

Further evidence of maldistribution or non-availability of professional care is evident in a review of professional attendance at the time of delivery. The figure for the Republic of Panama (1968) reveals that approximately 61% of the total 53,000 births had professional attendance at the time of delivery. However, here again the marked urban/rural disparity is evident, with 96% of the 21,000 urban births but only 37% of the approximately 32,000 births being covered by professional attendance. (Table 32)

The assumption that professional attendance at the time of delivery would significantly alter maternal and infant mortality is partly supported by a review of infant death rates for urban and rural areas.* In 1968, the infant death rate for urban areas was approximately 32 per thousand live births, whereas in the rural areas this was 46 per thousand live births, a rural excess of almost 50%. This may reflect healthier living conditions, e.g., better water supply in urban areas. Probably, it suggests greater availability of services to patients in urban areas than in rural areas at times of illness and delivery, as reflected in lower infant death rates (as well as in general mortality figures and in data reporting professional care and medical certification). Perhaps services are indeed available in rural areas but not utilized to the extent they are in urban areas, although this seem unlikely. Instead, relating mortality and morbidity rates to the distribution of care to the population, either as a whole or to specific segments, it would appear that, given the availability of simple health care systems to a larger percentage of the rural population, the rates of illness and death should be reducible to the level that now exists in the cities.

Data from Immunization

Analysis of immunization data provides two perspectives of the health sector. From the viewpoint of the recipient, the data allow the inference of the availability of routine preventive services. Since immunization is not necessarily dependent upon physician attendance, the most basic health services received by the population can be estimated. Coverage is far short of the national goal, with at least one-third to one-half of the susceptible population not receiving this basic preventive service.

From the viewpoint of the providers of care, the susceptibility to disease far in excess of a theoretical minimum results in high morbidity and mortality and places an unnecessary and expensive burden on care facilities and resources already severely limited. The result is inefficient use of these resources.

The following discussion seeks to demonstrate the relationship between immunization coverage and basic health care from these two perspectives, the implications for the future, and a brief outline of a possible approach to solution.

Table 33 presents data on immunization completed by year during the period 1964-1968. Data for BCG immunizations are not available for 1968. The data are based upon doses of vaccine used, adjusted to reflect multiple immunizations in series, and do not provide information on the number of successful immunizations (for those requiring a series of immunizations, or a successful "take").

* Infant death rates are calculated by deaths of children under one year of age per one thousand live births.

Since a national goal to immunize 80% of the susceptible population has been established, it is difficult to interpret the significance of the numbers presented in the table, or to estimate the various susceptible populations. Accordingly, these national immunization data have been calculated as percentages of the estimated annual "young population increase" for the years 1965-1968. This technique clearly presents a more favorable picture of the immunity status of the population than may exist in reality. However, it provides some insight into the best coverage the current system could provide if devoted entirely to protecting the high, susceptible, "new" population.

The annual increase of the young in the population is approximated by using the number of live births minus deaths of children under one year of age. During the years 1965-1968 this increase ranged from 45,000 to 48,500 (approximately 3% of the total population). The estimates of percentage immunization protection of the "young population increase" for smallpox, tuberculosis, and DPT are presented in Table 34.

Assuming that each individual immunization confers life-long protection, the best experience that could be anticipated for the assumes that all immunization is going to the "young population increase" and that no person already immune is re-immunized.

Given these assumptions and at current population growth and immunization program rates, the "young population increase" would enjoy virtually complete protection against smallpox, approximately 65% protection against tuberculosis, and 50% protection against diphtheria, pertussis and tetanus. Except for smallpox, these figures fall short of the national goal of immunizing 80% of the total susceptible population. The immunity of the total population is far below the theoretical percentages presented above.

Although these may seem to be relatively satisfactory immunization levels, a restatement of the situation using tetanus as an illustration is enlightening. From Table 34, it is determined that the 1967 campaign rate could have protected only 70% of the yearly "young population increase." (This is not 70% but only 2% of the total population.") Therefore, if immunization is to continue at the rate and is restricted annually to the "young population increase," leaving the remainder of the population unprotected, the best that can ever be expected is that only 2/3 of the whole population will be protected. Moreover, it will take a full generation to achieve even this level of protection, which is again far short of the national goal of 80%. The projected tripling of the population within the next generation will require a similar increase in the immunization program just to maintain the current inadequate level of coverage.

Immunization programs can be designed to achieve optimal allocation of limited resources. For example, if the BCG program were to continue at the current national rate, maximum protection could be achieved by allocating the immunization resources through the basic health services to those provinces with high incidence and prevalence. Three such provinces stand out: Colon, with a relatively good supply of professional personnel and facilities, but with very crowded living conditions; and Darien and Veraguas, with inadequate and decreasing health care resources.

Combined intensive use of the simpler therapeutic regimens and of preventive measures are logical in these areas. Studies by the World Health Organization indicate that the simplest diagnostic/treatment approach for symptomatic patients in developing countries will benefit only 5-10% of the active tuberculosis cases at any one time. Cost-benefit studies show that BCG vaccination will be considerably more successful. The important question, however, is not whether BCG vaccination should totally replace diagnostic/treatment programs but whether it is possible to determine the optimal combination of immunization and simplified treatment to provide maximum protection from tuberculosis at reasonable cost. The problems of tuberculosis control and the possible costs and benefits of BCG vaccination in Panama are considered more fully in the appendix section, "Tuberculosis Control."

These suggestions are presented as a way of approaching the problem of providing protection for the population against selected diseases.

HEALTH RESOURCES

In 1967, the government of Panama spent 38.4 million balboas (dollars) on health institutions, health personnel, and supplies. Seventy percent of the total was spent for curative services; half of this was used to treat respiratory illnesses, accidents, mental illnesses, tuberculosis, and dental illnesses. The other 30% was used for preventive measures to combat dysentery, nutritional deficiencies, intestinal parasites and anemias, the salmonelloses, and malaria. Virtually all of the preventive funds were administered by the Ministry of Health and IDAAN (National Water and Sewerage Authority). Data on the distribution of these funds for preventive services are not available. A 1969 study published by the Ministry of Health noted that because preventable diseases are major causes of death in Panama, funds should be reallocated to increase preventive measures.

Distribution of Facilities and Personnel

The distribution of health services in Panama follows a pattern similar to distribution of other services. The major health facilities are concentrated in the large cities of Panama City and Colon, the great majority being in Panama City. Many of the capital city's residents are eligible for medical services provided in the Canal Zone (although families of native Panamanians who work for the Canal Company are ineligible for services unless the marriages are legal and the children considered legitimate). The major Social Security hospital, the psychiatric hospital, the University of Panama, Social Security clinics, and other large public and private hospitals are located in Panama City. Over half of the hospital beds in the country are in Panama City, with another concentration in Colon. Although Chiriqui has a relatively large number of beds, the ratio of beds per person is low because of the size of the population. While the physical facilities are relatively abundant in Panama City, the private physicians and facilities are undoubtedly too expensive for the poor. Data on hospital beds show that private hospitals are filled only to half of their capacity, while government hospitals are two-thirds filled and bed occupancy of the specialized hospitals exceeds 100%. Data on the quality and distribution of services within the city are not available. (Table 35)

Health facilities in the rural areas are few, and no data are available on the distribution of services in these areas. The major rural facilities are the Integrated Medical Centers: combinations of the local Health Centers with basic hospitals. Due to this combination of services, the number of rural facilities has decreased in the last few years. However, the Ministry of Health feels that this integration of services has not decreased the volume of services, while providing higher quality health services to more of the population. (Table 36)

The distribution of health personnel in Panama also follows the pattern of concentration in Panama City, lesser concentration in Colon, and sparse numbers in the rural areas. (Tables 37a,b, and c)

Physicians

The 1969 Panamanian Medical Directory listed 843 physicians, of whom approximately 75 were continuing studies abroad and a smaller number were retired from practice. Two 1968 studies estimated that 700 physicians were actually practicing in Panama. This meant that there were approximately 5.4 physicians per 10,000 people in the nation. This ratio is roughly one-half of the U.S. ratio and satisfied the WHO minimum standard of 1 doctor per 10,000 people.

Approximately 70% of all physicians are located in Panama City, which means that Panama city has more than double the national physician/population ratio. A review of the 5-year trends from 1964-68 showed an increase of concentration in Panama City. There was only a slight increase in concentration of physicians in other provinces and in the city of Colon, which also exceeds the national ratio. The province of Veraguas suffered a steady loss of physicians over the 5 years, while the province of Darien had no increase. (Table 37a)

Panamanian law requires that two years of internship taken within the country must be spent in government service; the first in a government hospital or in an institution recognized by the government for this purpose and the second in institutions located in the interior of the country. Medical interns who have spent their first year at the National Psychiatric Hospital or the University of Panama School of Medicine are exempted from spending the second year in the interior.

Virtually all of the physicians listed as practicing in the rural areas, usually in the Integrated Medical Centers, were recent graduates of medical schools and were not licensed as physicians. Thus, most of the physicians in rural areas are probably serving the required second year of internship in the interior of the country. If this is true, rural physicians are less experienced than other physicians, and they are unlikely to provide continuity of care for more than the one required year of their internships.

Almost all of the physicians practicing in urban areas divide their time among more than one job. Usually, the physician has a private "clinic" (similar to private hospital practice in the U.S.), works in one of the major hospitals, and often teaches at the University of Panama Medical School. Thus, although hospitals may appear to have sufficient numbers of physicians, they are undoubtedly understaffed because the physicians give only part of their time to the hospital. Data on this division of time are not available.

Nurses

In 1968, there were an estimated 996 practicing nurses in Panama. A 1968 WHO survey listed 968 "fully-qualified nurses," 24 assistant nurses, and 1,397 auxiliary nurses. This means that the ratio of fully qualified nurses to practicing doctors is 1.3 to 1, less than the WHO minimum standard of two nurses for every physician. The distribution of nurses is essentially the same as that of physicians, with 70% located in the province of Panama, 5% in Colon, and surprisingly an additional 10% in Chiriqui. In this latter province, the somewhat more favorable ratio of two nurses per physician is found.

In a country with limited health resources and personnel, nurses could be more widely and economically used as primary sources of care. However, because of the relative shortage, this is not really possible. In addition, nursing is a relatively low status profession with little autonomy. Nurses are generally not allowed to assume a great deal of responsibility, especially where they are under the supervision of a physician. In the rural areas, where physicians are less numerous, nurses may have a great deal of autonomy and responsibility. In addition, the conversion of the total nursing education program to a degree program at the University of Panama may improve the quality but limit the quantity of trained nurses. (Table 37b)

Training of Health Professionals

Deficits in numbers of health personnel persist despite an increase in professional training programs. About 50% of doctors entering practice in 1966 were trained at the Medical School of the University of Panama. The remainder were trained abroad, principally in Spain, Mexico, Colombia, and the U.S.A.

The one nursing school in the country is located in the Hospital San Tomas which is affiliated with the University of Panama. In 1968, 47 nurses completed the four-year program. An 11-month program is provided to train auxiliary nurses. A one-year midwifery program for graduate nurses has replaced the former midwifery courses for non-nursing personnel. Nurse-midwives can serve a broader range of functions in rural areas, with less supervision than is possible with midwife specialists alone.

In 1968, a faculty of Dentistry was created at the University of Panama. Pharmaceutical students were enrolled under the Faculty of Natural Sciences and Pharmacy in 1968. Sanitary engineers are trained by the Engineering Faculty, and programs are also available to train laboratory technicians and sanitary inspectors. In general, however, training in paramedical and auxiliary fields has been insufficient and of low quality. A great amount of valuable physicians' time could be saved by the proper utilization of such personnel as statistical

assistants, clinical technicians, and administrative assistants, in addition to nurses and auxiliary nurses.

Physician Education

A survey of medical education in Latin America has been conducted by the Department of Human Resources Development of PAHO. This report draws heavily on the information presented in that study but also includes other information that has become available. In addition, the comments about the general educational system which are included in the appendix report apply to a great extent to the conditions of medical education.

Latin American medical education was originally patterned after the European schools, but after the Second World War has increasingly drawn upon the experience of the North American schools. Because of the problems of limited national resources and the prevalence of communicable, and especially tropical diseases, preventive medicine, and the newer concepts of community medicine gained a more prominent place in the Latin American schools than in those of the United Sstates. Attempts to establish a U.S.-type departmental structure have generally been unsuccessful, except in terms of nomenclature, and are hindered by the high percentage of part-time faculty. Several major problems are identified as follows:

a. Rigid organizational patterns that limit communication prevent the development of an evolving, integrated curriculum.

b. Shortage of teaching staff and material resources. Teachers are generally part-time. In Panama, in 1967, over 80% of the medical school faculty worked less than half-time in their teaching profession, the remainder of the time generally spent in clinical practice. Only 15% of the faculty in Panama is full time.

c. Because of the shortage of teaching staff, teaching tends to be essentially theoretical, and learning is by rote with little opportunity for discussion or observation. Often the material taught is not up-to-date.

d. A large proportion of students are inadequately prepared by their previous educational experience. As a result, there is a high proportion of students whose progress is "irregular," i.e., repeating a year or making up courses missed in a previous year. In Panama, this figure is relatively low for Latin America, running approximately 8%. The net effect of a significant number of irregular students is the increased cost of education, overloading of facilities, prolongation of the period of medical education, and fewer graduates per year.

e. There is a major shortage of modern medical textbooks for the student body. This is primarily because of the excessive cost of such books for the student, and in part because of the smaller number of books available in Spanish in Latin America. The problem is complicated by the relatively poor medical libraries associated with the medical schools. A major effort has been devoted by the PAHO Program of Textbooks for Medical Students to correct this deficiency.

The medical school is currently feeling some pressure to shorten and simplify the medical curriculum. The school, however, wants to produce well-trained physicians to lead the health care team. The curriculum is currently being altered to deal more specificially with Panama's health and disease problems. The school is also making efforts to discourage early specialization.

Specific information and data are available for Panama which allows the analysis of the the relative availability of physicians for the future. In 1967, there were 148 students studying medicine at the University of Panama. This represents only 3% of the total University matriculations and is the lowest percentage for all of Latin America. However, it should be noted that current data reported by the Institute de Cultura Hispanica to the Health Sciences Education and Information Center in 1969 identify a total of 534 Panamanian students, of whom 460 were male and 74 were female. in the schools of medicine in Spain. In addition, a significant number of physicians receive their training in the United States. Consequently, it can be seen that the medical school in Panama meets only a small part of the national supply of

physicians. It should be noted that the Spanish schools of medicine are heavily overloaded with students and suffer many of the problems of the Latin American schools so that the quality of training is open to question.

The extent to which women participate in the labor force can be viewed as a social indicator, especially with the participation of women in university study and the study of medicine. In Latin America, the medical profession has been traditionally reserved for men, much as elementary school teaching has been for women. This trend is changing rapidly as is demonstrated by the increasing enrollment of women in medical schools; it appears that the matriculation of women represents effective demand for medical education by women. In this regard, Panama ranks in the middle of all Latin American countries, with approximately 18% of its medical students being women. By way of reference, it was noted in the labor force summary that women constitute approximately 25% of the labor force of Panama.

The changing attitudes toward medicine as a profession are also reflected in the increase in matriculations in the first year of medical study compared with the increase of the population in the age group 15-19 years. During the five year period, 1962-1967, the number of admissions into medical study increased approximately 12% annually. The annual rate of increase of the population aged 15-19 years was only 4% (1960-1965). This is rather remarkable compared to the average for Latin America. The significance of the observation becomes apparent when it is noted that by 1975 enrollment will have increased 70% over for present level if the current growth rate of 12% persists. It will accordingly be necessary to plan for the expansion of the present teaching facilities or to build new facilities if the demand for medical eduction is to be met, and if the demand for physicians in the future by a growing population is to be met. The alternative solution of limiting admissions to medical study would be only a short-range solution to eventual overcrowding of the school and would exacerbate the shortage of physician manpower for the country unless a large number of foreign graduates entered the practice of medicine in Panama.

Again, the problem of inadequate faculty time should be emphasized. In 1967, only 15% of the faculty devoted full-time work to their teaching responsibilities in the school. Over 80% of the faculty spent less than half of its time in these responsibilities. The situation might even look worse on paper, except that the small number of medical students (148) to full-time faculty (10) allows the respectable average of 14.8 students to full-time faculty--relatively good for Latin America. However, it is clear that all subjects cannot be covered adequately by this full-time faculty and that the consequence of this fragmented teaching process is the loss of communication by participation and demonstration.

A further problem for the student is the high cost of medical education in Panama. The annual cost per student in 1967 was estimated at $2100. This exceeds the average of the 72 Latin American schools by over 50% and amounts to 3 1/2 to 4 times the per capita GNP for Panama. Considering the length of study necessary for the degree, this represents a significant economic barrier.

As was noted in the education study, primary school is a six-year block, followed by two secondary school cycles of three years each. An additional, seven years of pre-medical, general, and medical studies are necessary for completion of the medical degree.

There are many problems still to be solved. However, Panama is in a distinctly better position than many of the countries of Latin America as far as physician training and manpower. Additional health manpower planning could have a significant impact on the system of delivery of care in Panama.

A comparison of the status of medical education in Panama with that of the other Latin American countries is presented in Tables 38a,b, and c and in Illustrations 7a-f.

Medical Supplies

Little information is available about medical supplies in Panama. Most drugs and equipment are imported. There are two drug manufacturing companies in Panama, but the extent of the manufacturing processes could not be determined. It is possible that they are primarily drug repackaging plants. A 1968 PAHO report estimated the annual retail cost of drugs consumed in Panama at $12 million.

Responsibility for the safety of pharmaceuticals rests with the Division of Pharmacy, Food and Drugs of the Ministry of Health. All firms wishing to sell drugs in Panama must submit test samples to the Laboratorios Especializados de Analisis (LEA), affiliated with the University. LEA is financed by fees collected for tests from the companies. In addition, the government spends $12,000 on drug control and employs at least 9 part-time drug control inspectors and 27 scientists from the University as part-time testers. The government expenditure in total amounts to $7.7 for drug control per $1,000 of drugs consumed. This is the highest figure in the Americas and seemingly reflects a relatively high level of drug control. Pharmacists provide some "medical care" by making over the counter diagnoses and prescribing and administering drugs based upon symptoms described by the patient or family members.

Health Regulations in Panama

Health regulations in Panama are found in the Sanitary Code, Law 66 of November 10, 1947, with modifications. A PAHO study of sanitary codes in the Latin American countries points out that such codes tend to be general, often merely listing areas in which the Ministry of Health is empowered to act. The codes are usually supplemented by other laws regulating specific health problems. The large cities also have their own health ordinances which deal with their particular situations in greater detail than the national codes.

Panama officially complies with the WHO International Sanitary Regulations which deal with international reporting and control of quarantinable diseases. The Republic has few provisions to control specific transmissible diseases. Zoonoses are covered in the general regulations, and there are specific provisions pertaining to rabies and foot-and-mouth disease.

The regulations set general sanitary standards for production, processing, handling, and sale of foods. There are also a number of provisions governing the preparation and sale of pharmaceuticals. Environmental sanitation regulations cover water supplies and sewerage systems but not industrial hygiene or urban housing.

The national regulations apply to public but not private hospitals. In general, there is control of the activities of the most highly trained medical personnel but not of the various categories of medical assistants and auxiliaries.

The PAHO study points out that health regulations are often not enforced. Their current status is not known. Panama does provide criminal penalties for violation of certain provisions of the Sanitary Code. These include generally penalties for contamination of water for public use, adulteration of food substances for public consumption, and any dealing in adulterated medical substances. There are no similar penalties for spreading of diseases or for dealing in narcotics, although such provisions are common in Latin American countries.

HEALTH CARE ADMINISTRATION

National Government Activities

In January, 1969, the Ministry of Labor, Social Welfare and Public Health was divided into a Ministry of Labor and Social Welfare. The Ministry of Health is responsible for the promotion and protection of the health of the country through the formulation of national health plans, the implementation of programs, and the provision of health care services. The Ministry of Health is not the sole provider of health care. A major segment of care is available through the Social Security Agency and private sources. The Ministry of Health is comprised of a Directorate General and Sub-Directorate General of Health and two divisions, one for administrative services and the other for technical services. An organization chart of the Ministry is presented in Illustration 7.

The technical service division is responsible for the activities of the National Malaria Eradication Program (SNEM), the maternal and child health services, adult medical care services, epidemiology, and general technical services (nutrition, food and drug control, laboratories, health education, etc.).

The Ministry maintains relationships with autonomous agencies, especially the National Red Cross, the Social Security Agency, the National Water and Sewerage Authority (IDAAN), and the National Lottery. In addition, it has under its control several technical advisory bodies, including a National Health Planning Commission.

The National Health Planning Commission is comprised of the directors-general of the autonomous health-related activities, the Dean of the Faculty of Medicine of the University, the Director of the Planning Office of the Presidency, the President of the Health Commission of the National Assembly, and the Director-General of Health, who is the chairman. In April, 1963, a National Health Plan was issued covering the period 1962-1970. This plan was limited in coverage to the responsibilities of the Ministry of Labor, Social Welfare and Public Health. In 1967, a national health planning course was conducted based upon the PAHO methodology. Following the establishment of the Minstry of Health in January, 1969, a national health planning department was set up within the Ministry. New health planning activities are to involve the Ministry of Health, the Social Security Agency, and IDAAN.

The country is divided into three "sanitary regions," eastern, central, and western regions, each of which is composed of several health areas. Each region has a decentralized health administration headed by a regional director advised by a regional health committee. The regional director is responsible for all the activities and programs within his region and operates under direct authority from the Directorate-General of Health. Activities in the individual areas are under the supervision of the area directors.

The Ministry of Health controls the 32 government-run hospitals, the 38 health centers, the 109 sub-centers of health, and four mobile health units. The Social Security system operates 12 polyclinics. The Ministry is responsible for the supervision of the physicians working in the government service.

These campaigns merit special mention. The three-year malaria eradication plan, operated by by SNEM with USAID and PAHO assistance, started the first DDT spraying cycle in 1969. In addition, intensive screening and mass chemotherapy activities have been extended into the provinces, and it is now anticipated that malaria transmission will be interrupted within the three-year period. The National Anti-tuberculosis Campaign is the primary government activity for the control and treatment of tuberculosis. The stated general objective is the diagnosis, treatment, control, and rehabilitation of active cases of tuberculosis and the protection of contacts of cases. As part of this activity, the National BCG Vaccination Service runs programs in skin testing and vaccination of negative reactors. One goal has been the routine application of BCG to all new-born infants. Diagnosis and treatment of active cases are provided in a number of institutions, but some are specifically identified; the tuberculosis dispensaries in Colon and David (these are currently autonomous, but the 1969 Ministry of Health Report recommended integration of these facilities into local hospitals) and the Hospital Nicolas a Solano. Specific data on radiographic examinations by institution are presented in Table 39.

In 1967, the Ministry of Health cooperated with the Institute of Nutrition of Central America and Panama (INCAP) and the U.S. National Institutes of Health in conducting a national nutrition survey. This survey identified protein-calorie malnutrition in the population under five years as a significant problem. There was also a high prevalence of endemic goiter and a vitamin A deficiency. The present applied nutrition program covers approximately 120 rural communities with a population of about 84,000. This program seeks to coordinate the nutrition-related activities of the Ministries of Agriculture and Education with those of the Ministry of Health. It also distributes food supplies throughout the CARE/CARITAS programs. Plans to improve coordination, efficiency of distribution, provision of food to workers on sanitary projects, iodization of salt and fortification of foods, and to promote a nutrition-oriented manpower force have been developed by the Nutrition Section of the Ministry of Health.

The Social Security Agency also provides a significant amount of health care. This agency operates autonomously under the Ministry of Labor and Social Welfare. Social Security operates the Hospital General in Panama City and several polyclinics in the Republic. It also

provides financial benefits for old age, invalidity, death, sickness, maternity, and work injuries. As of July 1, 1970, coverage is to be extended to all the districts to include approximately 60% of the working force population. For additional information concerning the Social Security Agency see Table 22 and Illustration 9.

IDAAN is another health-related autonomous agency. All funds of IDAAN are listed as health expenditures in the national budget. The PAHO Center for Health Planning in Santiago, Chile estimates that 50% of water supply and 80% of sewerage system expenditures are directly linked to the health status of the population. Thus, counting all IDAAN expenditures with the health sector slightly inflates the amount which the government spends on health.

Because health care is delivered through several mechanisms, it is difficult to determine the amount spent for care. No data are available regarding the expenditures for medical care from private sources. In a recent study from the Ministry of Health it is estimated that the total government expenditures for health care in 1968 were $45.9 million, an accumulative increase of 13.7% over the 1960 expenditures which were $16.4 million. The increase resulted primarily from the increased expenditures of the Social Security Fund and IDAAN of 19.8% and 22.0%, respectively, over the period 1960-1968. At the same time, the Ministry of Health (then a part of the Ministry of Labor, Social Welfare and Public Health) decreased its contribution relatively although it showed a slight absolute increase. In 1960, the Ministry of Health contributed 73.3% of the government funds for health care, and while it increases these expenditures annually by 3.7%, by 1968 it was responsible for only 35% of the total government health expenditures. Since 1968, however, the Ministry of Health budget has been increased somewhat. In 1969, the Ministry of Health budget of $18.2 million was 13.4% of the total government budget. The Ministry of Health feels that this signifies a desire on the part of the present government to improve the health of the population, with a realization that health is an indispensable factor for economic and social development.

In the light of the rapid population growth, however, the increased expenditures in health are not so dramatic. Although the total government expenditures for health almost tripled from 1960 to 1968, on a per capita basis these expenditures were not doubled. The increase over the eight-year period also does not take into account the inflation rate of 6% per annum. While the Ministry of Health budget portion of the total government budget increased 1.4% from 1968 to 1969, the population increased 3.3%. The government is making impressive advances to improve the health of the population, yet these advances are made more difficult by the very rapid growth of the population.

Additional funds for health care are also available. Law now requires that 5% of the Municipal budgets be spent for health care. Other sources of assistance include the voluntary help contributed by citizens in their communities, programs financed through the National Health Planning Commission, and the external financial and technical assistance provided by the international organizations.

External Assistance

Panama receives development assistance from a variety of sources including USAID, PAHO/WHO, the Inter-American Development Bank, and several private organizations and voluntary agencies.

The external assistance programs are reviewed here as they relate directly to the health sector and as they relate to other sectors where health conditions may have a direct or indirect effect on the success of the programs.

Programs directly affecting the health sector are summarized in Table 40. Emphasis is on the problems of population, malnutrition, rural health services, organization of health services, water supply and sewerage systems, health planning, tuberculosis, malaria, and yellow fever. These are areas of major importance to the health development of the country. It is difficult to determine the impact of these programs on the health situation. No attempt has been made here to evaluate the technical performance of these programs.

It appears that there are a few areas of particular significance that are not receiving assistance from any external source, e.g., continuity of care in rural areas and health education in general.

Although health services in the rural areas and the rural mobile health units are assisted, there appears to be no external assistance to the development of incentives to attract health personnel to the rural areas on a permanent basis. A significant problem in these areas is that what little care is available is not utilized effectively. This may be because most rural physicians are fulfilling a required one-year internship and as temporary members of the community may not be accepted.

Assistance to the health sector also fails to include identified health education programs. There are probably some health education activities incorporated in the population and nutrition programs, but these activities are not specified. In a country where a large proportion of the deaths are caused by preventable diseases or accidents, the population should have some basic knowledge of health and safety practices. In addition, health education could greatly improve the utilization and effectiveness of health services.

A great deal of external assistance goes to sectors other than health. Urban and rural development, highway construction, agricultural growth, industrial development, government reform, improved education, and increased tourism are major concerns. USAID is financing projects in each of these and other areas. The 1971 projects are listed in Table 41.

Maximum dividends from the investments in the many areas could be achieved through an awareness of the impact of each sector upon others. There appears to be little coordination, however, between sectors in the delivery of assistance. It also appears that some projects occur as the result of AID policy, and not necessarily in response to pressing country needs.

Health conditions may have a very significant impact upon the non-health sectors. In the rapidly growing urban areas, unemployment has become a significant problem. The government and USAID are working to improve the situation by working with employers to provide more jobs. The provision of jobs will not alter the situation, however, if those in the working age cannot perform due to illness. The same applies in the rural areas where loans and credit are now being extended to small farmers. If the farmer is incapacitated through illness, his crops may fail, jeopardizing payment of his loans and making extension of credit impossible for him.

Attention is being focused on the development of the Central Provinces with the aim of maintaining the population in those areas. The provinces furnish the largest numbers of migrants into the cities of Panama City and Colon. In the proposals for the development of this area, no mention is made of the provision of better health facilities.

External assistance to education has also been significant. The high priority given to education is reflected in the estimated 38% of the government budget devoted to education in 1969. If children are ill and malnourished, their ability to learn will be impaired.

The above are illustrations of the interrelationships of the health status with other sectors of the society. They demonstrate the need for policy-makers to realize the potential for positive change in several areas, with limited resources. Over the years 1946 to 1967, the United States alone extended financial aid to Panama amounting to $205.9 million. During the same period, the international organizations contributed $51.8 million. For funds such as these to be most effective, all sectors must be considered.

HEALTH PLANNING

For many years, Panama has made a conscious effort to set development goals and to meet the expectations of these goals. The Republic has participated in international planning activities through the 1961 Charter of Punta del Este, and more recently, the PAHO Center for Health Planning. The charter represented a commitment to accelerate economic and social development. The training offered through the PAHO Center for Health Planning provides high level government officials with the planning methodology for analyzing problems and establishing norms for health care. Using these techniques, the government can identify the major areas of concern and develop plans to alleviate some of the health problems.

Within the Office of the President is the Office of Planning and Administration (previously the General Planning Administration). Under the Ministry of Health is the National Health Planning Commission.

Evaluation of the problems of health and recommendations for future improvement have been major undertakings in Panama at least twice. In 1957, Dr. Ira Falk prepared a report, "Health in Panama: A Survey and a Program," and in 1963, the General Planning Administration prepared a National Health Plan for the years 1962-1970. Recent publications of the Ministry of Health suggest that health planning has become an important consideration for health care delivery.

Planning has also been applied to other economic sectors. In 1969, the Office of Planning and Administration prepared a development strategy plan: The Nature of the Panamanian Economy and a Summary of the Strategy for National Development for the Next Decade.

The Falk Survey: Health in Panama

In 1957, at the request of the Ministry of Labor, Social Welfare and Public Health, two major reports were prepared by Dr Ira Falk. One of these, "A Review of the Social Security Program of Panama," was submitted to the Social Security Agency of the Ministry. The other, "Health in Panama: A Survey and a Program," was prepared in conjunction with economic studies being conducted by the Republic of Panama and the International Bank for Reconstruction and Development. The health survey was a major undertaking, providing a brief background of the disease problems of the Republic and a major review of the resources, facilities, and personnel, with particular attention to administrative relationships within the health care system. Out of this survey came 59 major recommendations, some general and some for specific program and disease categories. Although it would be impractical to attempt to summarize these recommendations, certain points stand out:

1. The Republic should broaden and strengthen the health services for both the rural and urban populations by (a) improving efficiency, and (b) emphasizing prevention of disease, with permanent full-time employment.

2. Sanitation services (water and sewerage) should be under the control of the Department of Public Health. Facilities should be improved, and planning for growth should be started.

3. Highest priority should be given to the five-year malaria eradication program assisted by PAHO and UNICEF.

4. Anti-tuberculosis activities should be intensified, emphasizing selective case-finding, treatment, and immunization.

5. Communicable disease control should be expanded with new staff, improved statistical services, laboratory services, health education services, etc.

6. Low-cost housing and slum clearance should be undertaken, especially in Panama City.

7. Health Centers, especially in rural areas, should be developed as primary sources of care, with emphasis on preventive services, and should be integrated into a national system of general hospitals.

8. Before increasing public expenditures for health services, the health care system should be reorganized and other recommendations, especially administrative reform and health planning, should be implemented.

Many of the recommendations of the survey and proposal have been implemented. Decentralization was achieved with regional responsibility for a full range of public health services. A malaria eradication program was started and is continuing with apparent success. The anti-tuberculosis campaign is using radiographic screening and BCG immunization. Health centers have been established, and a new rural mobile health program (PUMAR), sponsored by USAID, is being undertaken. The Ministry of Health is an autonomous entity, although the Water and Sewerage Authority (IDAAN) was not incorporated within the Ministry. Administrative reform was also begun. The Falk survey seems to have been a significant influence in the progress of the past decade.

National Health Plan for 1962-1970

In April, 1969, the General Planning Administration in the Office of the President prepared a National Health Plan to cover the years 1962 to 1970. The Plan evaluates the basic health problems and defines priorities and objectives as follows:

1. Evaluation of the Basic Problems:

   a. Morbidity and mortality:

      It is difficult to quantify the problems because morbidity and mortality data are insufficient; there is no uniformity of notification standards; and records from hospitals, health centers and private practices are not coordinated. Despite these difficulties, major health problems have been identified by drawing upon the experience of those involved in the planning process. In general, gastroenteritis accounts for the largest number of cases in a sample population of infants and preschoolers and it was the most frequent disease for which care was sought. Anemia and malnutrition of varying degrees, plus the diseases related to intestinal parasites, are responsible for the greatest usage of hospital beds by children. Hospital emergency services carry a heavy caseload of the accidents and trauma responsible for high hospital bed occupancy.

      Tuberculosis and malaria tax the resources of all health institutions. Inadequate hygiene and resulting complications account for a significant portion of dental disease problems in infants and young adults. The complications of pregnancy and delivery are frequent, primarily as a result of inadequate care.

   b. Services:

      Health services are concentrated in the cities; inhabitants of many small communities (300 to 1,000 persons) are completely without services. Due to the lack of roads in the interior, health facilities are virtually inaccessible to a significant portion of the rural population. Facilities that are accessible operate irregularly due to the lack of personnel and good organization. Lack of potable water supplies is a major problem in both urban and rural areas, particularly in the latter.

   c. Organization and administration:

      In some parts of the country (probably urban areas), there are several health facilities (hospitals, Social Security consultants, private practitioners, and Health Centers of the Ministry of Health)all acting independently of each other. This situation creates a duplication for some and no services for others. Until 1962, the preventive and curative services of the Ministry of Health were separated with different resources and goals. The services are now combined. Adoption of the decentralized administration, recommended by the Falk Study, aggravated existing problems and created new ones. Problems of increased demand for services, rapid population growth, and lack of trained personnel for all levels of health care have been further complicated by poor utilization of available health care, the absence of a career service, and the vacating of jobs due to low wages. Because of poor maintenance, buildings, equipment, and transportation facilities are rapidly deteriorating.

2. Statement of priorities:

   Considering the health sector problems mentioned above, the plan lists the following priorities:

   a. Disease:

      Gastroenteritis and acute childhood diseases
      Complications of pregnancy and delivery
      Nutritional deficiencies

Tuberculosis
Malaria
Accidents and traumas

b. Services:

Water supply systems
Rural health services
Rural housing

c. Organization and administration;

Increased personnel, financial, and institutional resources
Improved technical and administrative organization

3. Proposal of goals:

Having evaluated the major health problems and stated the problems of highest priority,the plan defines goals:

a. General goals

A wider spectrum of medical care should be available to a larger portion of the population to avoid preventable deaths and illnesses and thus allow the full development of the individual. Family and community sanitary conditions should be improved, especially in rural and suburban areas, with emphasis on water supply programs, improved housing, and expanded medical services. Proper execution of the health plans should be assured by new programs of personnel training, financing, and technical administration.

b. Special goals

A major effort should be directed towards the provision of care to mothers and children in the fields of gastroenteritis, acute childhood diseases, malnutrition, and complications of pregnancy and delivery. At least 65% of those in rural areas and 90% in urban areas should receive medical attention.

The tuberculosis problem should be reduced by a concentrated effort with the public health services playing a major role in disease control. The specific goal would be reduction of morbidity and primary infection, accidents, trauma, and suicide by at least 60%.

Since these are the leading causes of death in the 15-34 group and the second-leading causes in the school-age and 35-54 age groups, the plan proposed increasing and extending education programs and increasing and improving treatment and rehabilitative services.

An average of 300 wells a year should be installed until water supplies reach at least 80% of the rural communities. Through IDAAN, all urban areas of the Republic should have adequate water supplies.

To provide the necessary medical professional personnel, plans of the University of Panama and the Ministry of Education have been coordinated to expand the Schools of Medicine and Nursing and to create the Schools of Dentistry and Public Health. To increase the numbers of auxiliary personnel the Division of Personnel Training has been created with sufficient economic resources to triple the number of these workers.

The plan of the Ministry of Health and the Social Security will be coordinated in order to avoid duplication in the areas of finances and maintenance. Combination of the two organizations should also be considered. Operation and maintenance of health care delivery should be self-financing, with increased community participation, to alleviate the burden for support placed upon the Government.

A Division of Planning within the Ministry of Health has been proposed to coordinate the technical administration of all organizations in the field. It is also proposed that the structures at all levels of health administration--central, regional and local--be recognized and that emphasis be placed upon the improvement of the administrative techniques and methods.

Health workers should be assured acceptable working conditions, adequate salaries and opportunities for promotion. All health workers should be included in the Civil Service (Cerrera Administativa).

c. Immediate goals:

Reorganization at the central and local levels
Personnel training
Delivery of integrated services in the Central Region

d. Long-range goals:

Delivery of integrated health services to all national territories
Administrative integration of all health sectors.

4. Goals for special sectors:

In addition to the above, efforts should be directed toward mental and occupational health services.

This brief summary of part of the Health Plan deals with the identification of basic health problems and the statement of priorities and goals. Another part of the plan deals with specific implementation of a plan for provinces, districts, and towns and establishes a timeframe for the initiation of these activities. Despite the careful development of the plan, certain characteristics should be noted:

1. The evaluation of basic health problems agrees with the one presented in this Country Profile of Panama. In the National Health Plan for Panama, dental hygiene services were identified as a need. In the priority listing, dental hygiene is not mentioned.

2. The listing of priorities does not provide ranking or relative weighting. No decision-making criteria for resource allocations or relative payoffs of activities are identified.

3. The plan identified "specific goals" for the future, but these are not quantified or set within a timeframe, nor are resource allocations estimated. It is, therefore, difficult to develop evaluation criteria for the various activities.

4. The plan criticizes the actions based upon the recommendations of the Falk Study, although it proposes a similar reorganization for the national (central) and local administrations. Falk dealt primarily with decentralization and regional reorganization.

5. Only rural housing problems are considered. Perhaps because there is an Institute for Urban Housing (IVU), the plan did not include urban housing, yet any comprehensive Panamanian health plan should be concerned with the health implications of urban housing.

6. The plan includes almost all health activities and problems. Whatever is undertaken will therefore be seen as fitting into this broad context of the plan. Under these circumstances, it is difficult to establish criteria for the appropriateness of health programs for the need of the population.

National Development Strategy for Panama

In September, 1969, a development strategy plan for Panama was prepared by the Office of Planning and Administration of the Republic. The plan is entitled The Nature of the Panamanian Economy and a Summary of the Strategy for National Development for the Next Decade. The following is a brief description of the strategy with special attention to the health implications.

The plan begins with a description of the growth of the economy from 1957 to 1969. This growth has centered on the Canal Zone. Education (vocational and professional) is also given credit for contributing to the growth. The major sectors and their rates of growth over the twelve-year period are shown in Table 42.

Economic Development

The strategy for overall economic development includes nine major areas. The primary purpose of each development sector is to contribute to the national wealth. These sectors are as follows:

1. The Colon Free Zone. The Free Zone is to be expanded.

2. The international airport at Tocumen. The airport is to be expanded to allow for increased tourism and cargo capacity.

3. Efforts are being made to attract more tourists, including the North Americans from the Canal Zone. Tourism provides money in exchange for goods and services, which in turn have provided more jobs. Tourist attraction depends a great deal on the health status of the country. The action taken by the country to encourage tourism includes hotel expansion and public relations. Greater consideration might be given to potable water supplies, sewerage systems, eradication of the fatal communicable diseases, increased transportation facilities, and other improvement programs.

4. Fifteen international banks are now located in Panama. The plan suggests that additional efforts should be made to create an international banking center.

5. The plan suggests exploitation of land adjacent to the Canal Zone. How this land will be used is not specified. The plan encourages the negotiations of Panamanian sovereignty over the Canal. Negotiations are also underway for a Merchant Marine.

6. There have been recent discoveries of a variety of valuable minerals: manganese, copper, and iron. Further study is now needed to determine the quality of ore and extent of the deposits. These minerals are believed to be commerically exploitable.

7. Studies have been made regarding the economic potential of the shrimp and fish meal industries. However, the production of both is encouraged only in economic development terms with no mention made of potential domestic use to increase the currently inadequate protein food supply.

8. Beef exports are an important aspect of economic development. The plan notes that since foot-and-mouth disease has been eradicated, Panamanian beef brings a good price on the international market. Foot-and-mouth disease is still found in South America. If the export of beef is to be regarded as a major factor for economic growth, then provision should be made to prevent the reintroduction of foot-and-mouth disease when the Pan-American Highway, which will connect Central and South America, is completed through Darien. No mention is made of this in the plan, although the completion of the highway is a national and regional goal.

   The plan also encourages the production of rice, corn, and beans by suggesting fixing prices for these items and helping farmers with loans extended through the Ministry of Agriculture with the financial assistance of AID. The need for

extended rice and corn production is debatable (see Part I, Nutrition), while domestic bean production is economically and nutritionally advantageous and should be encouraged.

9. The plan proposes foreign investment in industries that would be located near the Canal Zone and would increase the export potential of the country.

The above is an indication of the priorities assigned to economic development. It is significant that health is not considered in this area. In the section that follows, the factors of economic integration on the regional and national levels, health is discussed. However, it appears that the success of several of the economic development projects will depend, to a large degree, on health factors. If this is true, then these factors warrant attention in the planning stage.

Economic Integration on the National and Regional Levels:

The plan recognizes that economic development cannot be accomplished solely through the means proposed above. In addition to those factors of primary concern, other areas must be considered for total development.

The first of these is the development of the physical and human infrastructure of the "interior" of the country. This is to be accomplished through the development of programs and to provide roads, electricity, education, health services, and communication networks in the rural areas. The health programs include the projected completion of the psychiatric hospital in Los Santos in 1970, installation of rural aqueducts, construction of three new health centers, improvement of the hospitals in David and La Chorrera, and the expansion of the mobile rural health units. Legislation in this area includes the Triennial Plan for Malaria Eradication and laws regulating the quality of milk products.

In addition to the development of the physical and human infrastructure, the plan considers the development of the agricultural sector, a policy of "urbanizing" the rural areas, and the industrial sector. Agricultural development has been mentioned previously the increased export of beef and fruits; and the increased production of rice, corn and beans. "Urbanizing" several of the rural areas consists of providing schools, electricity, jobs, and water supplies to certain areas. No mention is made of providing better quality health services, which could be an important contribution. Industrial development in the rural areas is treated superficially.

Social Integration of the Country

The plan presents a section of social integration of health, education, agrarian reform, community development, employment, job training, Social Security, cooperatives, and housing. The health sector deals with the expansion of health facilities in the rural areas with emphasis on nutrition, preventive services and the provision of water and sewerage systems for the whole country. If there is a serious concern about the nutritional status of the rural population, then some of the agricultural goals should be reexamined from the perspective of nutritional needs.

The only other sector that deals specificially with health is Social Security. Social Security coverage has been expanded and several new clinics have been constructed. The other sectors have health implications, but these implications are not considered by the plan.

It appears that Panama is aware of its economic development potential and is anxious to fulfill this potential. National pride, reflected in the development of a "national positive consciousness," demands that Panama move toward development at a rapid pace. To achieve such development, however, economic planners should not overlook the impact that health can have on the success or failure of their plans.

ADEQUACY OF HEALTH RESOURCES

The adequacy of health resources must be judged against actual demand for services and potential need. The adequacy of the supply depends upon the following:

I. Incidence, prevalence, duration, and severity of disease to be treated

II. The extent of preventive services

III. The quality and efficiency of professional practice

IV. The socio-economic and cultural factors that limit the quality of care received

V. The accessibility of available health services as modified by geographic and economic factors

VI. The level of health education, awareness, and expectations

(I) In the first section of the report, Health Status, it was determined that the disease load is significantly higher than it need be. Cases and deaths from communicable diseases are too numerous, especially childhood illness for which effective immunization is available. The enteric diseases could be effectively controlled and even eliminated by adequate sanitation practices and services. Geography and climate favor the development and complicate the eradication of tropical diseases, notably malaria and intestinal parasitism. Malnutrition is a critical problem of early childhood. Urbanization (which outraces available housing), employment, and urban services complicate the existing problem of tuberculosis. It is therefore reasonable to assume that health personnel are faced with a greater potential disease load than their counterparts in the industrialized societies of a more temperate climate.

(II) The immunization level of the population is below the national norm of 80% coverage of the susceptible population. Best coverage has been achieved for polio and smallpox through intensive widespread campaigns. Major deficiencies in coverage are especially important for tetanus, measles, pertussis, and tuberculosis. These diseases inflict significant morbidity and mortality. Measles in particular is an important cause of death in young children. With an epidemic periodicity of approximately five to seven years, another epidemic can be anticipated in the early 1970's. Deaths from measles have averaged 50-65 annually. There were two peak years: 1963 (with 363 deaths) and 1968 (with 215 deaths). Measles is particularly severe because of low resistance associated with poor nutrition and high incidence of enteric infections and parasites. The many cases and deaths attributable to preventable disease, especially tetanus, measles, and tuberculosis overload a health care system already spread too thin. Major segments of the population are far below optimum nutrition level. The borderline nutritional status is jeopardized by repeated enteric infections. Inadequate working conditions aggravate the situation still further. Combined with inadequate immunization levels, the result is often lethal or severely incapacitating to the individual and very costly in the consumption of limited services.

(III) It is not possible to evaluate the quality of health care from afar as it is delivered. It is expected that the physicians trained in the United States conform to American standards of practice.

The problems associated with medical training in Panama have been outlined; the standards are relatively high. Physicians who have studied in Spain generally do not have the same high level of academic exposure as those in the United States and Panama. How this is reflected in the care delivered to patients is a matter of conjecture at this stage. However, even if the quality of care delivered were ideal, as far as the training and competence of personnel is concerned, there is still the major problem of efficiency of delivery. It has been noted that over 70% of physicians are located in Panama City. (A similar pattern is noted for other personnel and for hospital beds.) Furthermore, almost every physician has at least two jobs, and many have more than two. With a significant shortage of nurses and the unwillingness of some physicians to delegate work and responsibility, duties devolve upon the physician, which could be performed by professionals with less training. As seen in the data on certification of births and deaths, physicians in the rural areas are frequently not available when there is an acute need. Almost all physicians in the rural areas are

completing obligatory service and most apparently leave after this has been completed, seriously jeopardizing continuity of care. Even under the pressure of limited resources, the current utilization and allocation of the resources is not the most efficient. Obligatory service of physicians may alleviate this problem to some extent, but it is not enough.

In summary, the limited health resources available are not utilized most effectively for the protection and promotion of health and the treatment of disease. Working within the constraints of these limited resources, it could be possible to deal with the problems identified above and to develop a more favorable health status of the population.

A P P E N D I X

The Appendix contains background working papers that present specific information or technical details relevant to the development of the report. Where additional background information is generally available from other sources, it has not been included here.

ECONOMY

Origin of the Gross Domestic Product

Since its discovery, Panama has been oriented towards servicing transit trade and international commerce. In the past 50 years the major force shaping the country's economic structure and development has been the demand for goods and services generated by the Panama Canal and the Canal Zone. In the terminal cities of Colon and Panama City an advanced, service-centered, commericially-oriented, urban economy has developed.

The economic activity in the urban areas involved light manufacturing, retail and wholesale trade, transportation, services to the large population in these areas, and activities of the Canal Zone. Of growing significance in Colon is the Colon Free Zone. Here facilities are available for offices, showrooms and warehousing, repackaging goods, and light manufacturing. Merchandise may enter and leave the Free Zone without the time-consuming formalities and expense of customs clearance. Panama benefits from taxes and fees, employment, and sales of goods and services; it has also become a center of international banking and has a large amount of capital available from that source.

While a concentration of human and capital resources occurs in the urban areas, the reverse is found in the rural areas. Farms are distributed throughout the country to the east and west of the Canal. In the east, only a few inhabitants are found in isolated settlements of single-family units; in the western provinces the farm areas are more densely populated as these are the areas of the banana plantations of the Chiriqui Land Company (a subsidiary of the United Fruit Company). The central provinces contain scattered farms of squatters, tenant farmers, and small individually-owned plots. Farms in Panama of less than five hectares in size make up 46 percent of all farms; farms from 100 to 200 hectares make up only 2.5 percent of the total number of farms but include 22 percent of the farm lands. Farms of more than 400 hectares make up only two-thirds of one percent of the total in number, but occupy 20 percent of the farm land. It may also be noted that the available farmland is not properly utilized; the coastal farmlands contain salt, and are therefore not as well suited for farming as the inland areas, which are largely undeveloped.

The major agricultural products include bananas, sugar, rice, corn, beef, and milk. Total agricultural production is growing at a favorable rate, although the per capita production has been less impressive. This growth is not directed primarily toward domestic food consumption. The production increment of nearly six percent from 1966 to 1967 was mainly due to an increase of 15 and 16 percent in output of coffee and tobacco, respectively, and to the incorporation of new banana-growing areas in Bocas del Toro. Bananas are the chief export crop, and coffee and tobacco obviously are of no food value to the domestic population. While the government realizes the need for improving the diet of the people, it encourages only the production of corn, rice, and beans by means of price incentives. The nutritional and economic implications of this program are discussed in a previous section on nutrition.

Although agriculture is currently the most important single sector of the economy, in recent years manufacturing, construction, power, commerce, services, and the financial sectors have grown more rapidly than the gross domestic product as a whole. These sectors are essentially of an urban nature and are related to the traditional role played by the country's central geographic position. The origin of the gross domestic product by activity is given in Table 43. As those sectors of an urban nature continue to grow economically, it can be expected that more immigration to these areas will occur, multiplying the current problems of inadequate food supply, unemployment, poor housing, and other results of overcrowding.

Other resources of importance to the economy include certain seafoods and minerals. Shrimp has become a major export in recent years. Figures on local consumption of fresh fish are not available. Copper ore has been found and surveys reveal that there is a sufficient amount to make further explorations profitable. At the present time the three major commodities produced in Panama from native materials are portland cement, clay products, and salt. The forest resources have been utilized only to a minor degree, although some hardwood forests exist and could be expanded to become very valuable. However, transportation problems by road or river make the development of forestry products difficult. There are no known coal or oil deposits.

Foreign Trade Pattern

Although Panama has a continuing negative balance of trade and outflow of private transfer payments, the deficit is normally offset by earnings from the Canal Zone and from sales to tourists and transients, which keeps the flow of U.S. dollars coming into the country. As mentioned above, Panama's chief commodity export is bananas; shrimp exports ranks second. Recently, petroleum products refined from imported crude petroleum have also become a leading export. The U.S. is Panama's chief market for exports. Food imports amount to about 12 percent of total imports. The U.S. provides two-fifths of all imports.

Economic Importance of the Canal Zone

It is difficult to assess the economic impact of the Canal Zone on the country as estimates from different sources vary widely. In addition, it should be kept in mind that the country was created as an independent nation upon the completion of the Canal. The Republic of Panama has never operated as a country without the Canal as an integral part of its operation.

In 1968, 22,000 persons were employed by the Canal Zone, making it the second largest employer after the Government. In the same year, actual salaries paid to residents of the Republic working in the Canal Zone amounted to 65.0 million balboas (although the actual unit of currency is the balboa, the Panamanian economy relies directly on the U.S. dollar; the balboa has parity with the U.S. dollar). Salary figures alone are probably not representative of the full benefits to the country from the Zone. The U.S. Government also makes $1,930,000 rental payment to the country for use of the Canal. * In addition, the commerical economy that is a growing force in the areas adjacent to the Canal exist as a result of the trade made available by the Canal. It has $160 million annually from the United States for goods and services.

In recent years there has been an increasing Panamanian interest in transferring the sovereignty of the Canal from the U.S. to the Republic. Many Panamanians feel that the country does not benefit enough from the Canal; however, it is difficult to know if at the present time the country could provide sufficient trained manpower to operate the Canal. There are also many political and economic considerations. In 1971, the sovereignty issue will again be under negotiation.

Labor Force

The following study is presented to estimate the composition of the economically active population of Panama and the relation this population may have to the cost of illness.

In 1968, the total population was 1.3 million. Of this, 720,000 persons were over the age 15, and 571,000 under age 15. For the purposes of this study the population under age 15 will not be considered. However, it should be noted that approximately 16% of children between ages 7-15 are not in school and may serve some economic function.

The economically active population constitutes the manpower available to produce goods and services and includes all persons of both sexes over the age of 15. It includes both the employed and the unemployed, but does not include the first-job seekers or the Indian population. Agricultural workers (whether small plot owners or workers for large companies), family workers, those who carry on "cotton industries," self-employed workers, employers, and all other types of wage and salary earners are theoretically included in the economically active, 409,000 of which were employed and 30,000 of which are unemployed. Of those employed, 303,000 were men and 106,000 were women. Forty percent of this labor force were involved in agricultural activity, and the remaining 60 percent were involved primarily in services, industrial manufacturing, and commerce. The distribution of the labor force by economic activity is shown in Table 44. The average wage for agricultural workers is less than $15/week. For nonagricultural workers the average wage is $23/week. There are, of course, wide wage differences among different types of occupations, sex of the worker, and location.

* Wall Street Journal, June 17, 1971

In 1968, the 30,000 described as economically active and unemployed are individuals who would normally fall in one of the categories mentioned above, but who were without jobs at the time of the census. In 1960, the largest percentage of the unemployed were found in the main cities of Panama City and Colon, where unemployment amounted to approximately 25 to 40 percent (respectively) of total unemployment in 1960. This was due in large part to the migration of the unskilled campesinos to the metropolitan areas. As urban populations are increasing in both cities, is is safe to assume that the unemployment rates will continue to be high in these areas.

While those who are unemployed are not considered in the costs of wage-earner illnesses, it is necessary to remember the tremendous burden illness is to the unemployed individual, and ultimately to the society. Such persons have no means available to them (such as Social Security) to assist them during their illnesses.

The group of those over age 15 who are economically inactive includes housewives exclusively occupied with the home, students, persons confined in institutions, persons receiving retirement pay or pension who are not engaged in any form of work, persons living on rents or profits, and old-age retirees who do not receive any form of pension. In 1968, there were 281,000 persons in this group. Of these, 43,000 were men and 238,000 were women. In that year, 51,000 persons were over age 65. Using sex ratio data showing that slightly less than half of those over the age 65 were men, it appears that there were approximately 25,000 men over age 65 in 1968. Most of those probably fall into the category of economically inactive, leaving approximately 18,000 men under 65 (most of whom are probably students) in the economically inactive category. Some women in this category are also students or over 65, but the majority are believed to be housewives exclusively occupied with the home. While it is difficult to ascribe monetary value to the services of the housewife, her illness certainly carries a high cost to her family and the society.

It is possible to obtain some very crude figures which will give some idea of the status of the economically active employed population. The following describe the employed population by activity (agriculture or non-agriculture), location, and sex of the workers.

EMPLOYED POPULATION BY ACTIVITY, LOCATION AND SEX OF WORKER
IN THOUSANDS

	Total			Agricultural Activity			Non-agricultural Activity		
Locality	Total	Men	Women	Total	Men	Women	Total	Men	Women
Total	409	303	106	163	155	8	246	148	98
Metropolitan	191	126	65	20	19	1	171	107	64
Rest of Republic	218	177	41	143	136	7	75	41	34

The data report that 95% of the agricultural activity is performed by men, and 5% by women. This may indicate that many female workers on farms, who are counted as economically inactive, are actually working on the farms. This seems reasonable, as many women traditionally share farm chores; thus, the illnesses of women also carry a cost to the economic system. However, their numbers cannot be determined from the available information.

The division of agricultural/non-agricultural activity is particularly significant for this study. As of July 1, 1970, the Social Security System will be extended to cover all workers who contribute. Most non-agricultural workers will be covered. Coverage for illnesses, including those not related to the occupation, that cause total disability will be 60% of the workers salary for the first three years, 40% for the next two, and 30% for the two following. Partial disability will be covered to the extent of 60% for 26 weeks, and in special instances up to 52 weeks.

While most non-agricultural workers will be covered, it is believed that less than 2% of the agricultural workers will be covered, as most of them are self-employed and do not contribute to Social Security. The impact of a disease on such a worker, then, not only disrupts the production of the economy, but also renders the worker seemingly helpless, with no financial assistance during his illness.

The costs of disease can be figured by utilizing the above information. If 60% of all those over age 15 are part of the economically active, employed population, it is assumed that 60% of all those over age 15 with a particular disease are part of that same population. If disease distribution is equal for all occupations and for urban and rural areas, then of the employed population with the disease, 60% are non-agricultural workers, and the remaining 40% are agricultural workers.

Various costs of the disease can be figured considering the costs to the individual, the society, and the government. These costs have been computed and detailed in the Appendix.

Government Budget

In 1968, the total budget for the Republic amounted to $141 million, with a regular budget of $125 million (the GNP in 1968 was $765.9 million). Of this, $103 million went to the various ministries and agencies--$30 million for Education; $18 million for Labor, Social Welfare, and Public Health; $15 million for Government and Justice; and $11 million for Public Works. The remaining ministries and agencies received less than $5 million each. These figures are given in Table 45.

The major source of income was from indirect taxes; in 1968 this amounted to approximately $50 million. Direct taxes amounted to $43 million. Total income for the year amounted to $135 million.

Cost of Living

Information regarding the cost of living in Panama is available almost exclusively for food costs. There are some consumer indices that indicate the change in costs for certain commodities over a five-year period for the cities of Panama, Colon, and David, and for the banana-growing areas of Bocas del Toro and Puerto Armuelles. These indices indicate that the costs for all sectors (food, housing, clothing, medical care, and others) are rising. In all geographic areas food and housing costs are rising rapidly; medical costs for Panama City and Colon are also rising rapidly, especially in Colon. Medical care costs are not given for the other areas. Housing costs have risen particularly rapidly in David, and clothing costs have shown a rapid increase in David and Colon. These cost indices were obtained from household surveys in 1962, and it is difficult to know how representative the samples may be. However, they do serve to give some indication of the rising cost of living not only in the urban areas as would be expected, but also in the rural areas and in David, an area which is proposed as an area for urbanization. Although costs are rising in Panama at a rate of 6 percent from 1962-1967, this rate is not so dramatic as that of the United States, where rates have risen 10 percent in the same period. This is shown in Illustration 10. Illustration 11 reveals the rising costs of the various sectors.

The nutrition study conducted by the Ministry of Health in 1970 provides additional information regarding costs of food. A survey was made in the City of Panama of the costs of the minimum sufficient diet at the lowest obtainable cost. The survey estimated that sufficient food for a week for a family of five would cost $14.73, or $63.00 a month. Other studies of the average income have revealed that in Panama City 42.7 percent of the families receive less than $150.00 a month, and 48.7 percent of the families of Colon receive the same. This would indicate that 42.7 percent of the families in Panama City and almost 50 percent of those in Colon must spend approximately 42 percent of their monthly income to meet the minimal food demands. Such a large percentage expenditure is probably unreasonable. A 1962 household survey done in Panama City revealed that an average of 34.0 percent of the monthly family income was spent on food. If this figure is realistically representative of expenditures on food, then many families are probably doing without even the minimal diet because of economic constraints.

There are no figures available regarding the percentage of incomes spent on medical care. The 1962 household survey gives the following expenditures in addition to the 34.0 percent for food: 8.6 percent, rent; 1.1 percent, other living expenses; 3.1 percent, heat and lighting; 5.0 percent, household items; 3.4 percent, household maintenance; 2.1 percent, domestic help; 8.9 percent, clothing; and 33.8 percent, miscellaneous. The miscellaneous

category probably includes medical care and medical articles, personal articles, entertainment, education, tobacco, and transportation.

General Conclusions

Panama has shown an increasingly favorable rate of growth in recent years. The GNP has risen at a rate of approximately eight percent per annum since 1960. Due to the accompanying rapid population growth, however, the per capita growth rate is not as encouraging. In addition, the benefits of the economic growth are not evenly distributed. Although only 50 percent of the population live in the urban areas, they produce and expend 80 percent of the resources. While there are fewer services in the rural areas there are also higher prices for many items. If rural development is to be accomplished and urban in-migration slowed down, then economic incentives should be provided along with the incentives in the areas of education and health facilites.

EDUCATION AND MANPOWER IN PANAMA

Under the direction of the Ministry of Education, the Panamanian education system is expected to further the nation's social and economic development. Although much progress has been made since the days when education was the province of a few Catholic schools teaching the children of the rich, great problems remain.

Under the Constitution of 1904, education is free for children from the ages of 7 through 15 and compulsory until the child has either completed 6 grades or reached the age of 16. Primary school is a six-year program emphasizing academic subjects such as Spanish, math, social studies, and religion. Criticism of this emphasis has led to the inclusion of "practical" subjects such as agriculture, science and hygiene, manual arts, and home economics. English is taught in the 5th and 6th grades.

Secondary school is divided into two cycles of three years each. The first cycle is intended to continue the general backgound of academic subjects. Those who do not wish this program may take the Sewing Program (3 years plus an optional year), the nautical training program (1 year), or the Vocational program (3 years, terminal). In the second cycle, students who have completed the first academic cycle may follow an academic program leading to the bachillerato, a degree in letters or science. In addition, there are 3-year programs offered in Agricultural, Commerce, Vocational, and Normal (teaching) studies and a 2-year program in Home Economics. Finally, there is an Industrial program offering classes in special skills, e.g., Electricity, Electronics, Automotive, Aviation, or General Mechanics.

The University of Panama in Panama City was founded in 1935 as the final step of the public system. The University is divided into nine faculties, offering degrees programs of varying lengths. The College of Philosophy, Humanities, and Education is the largest faculty and grants about half of the degrees awarded, while the College of Natural Sciences and Pharmacy accounts for an additional 25% of the graduates. A secondary school degree is required for entrance to the University (62.5% of the students entering the University in 1965-66 had followed the academic secondary school program, 17.1% came from the Commerical Program, and 16.9% had Normal degrees).

In addition to the public system, there are a number of private schools and one private university, Santa Maria la Antigua in Panama City, founded in 1965. The traditional practice of studying abroad continues, particularly on the university and graduate levels.

In theory, Panama is providing free education for its people, although the children still must provide books, uniforms, and bus-fare. In practice, there are still massive problems of expansion, improvement of quality, and integration with the country's overall socio-economic development.

The education system still does not reach all the children, even those in the compulsory schooling age group. It is estimated that 84% of the children in the group of 7 to 15 years attend school. That relatively commendable figure masks the fact that while most children

enter primary school, the rate of attrition is high. The figures are extremely crude, but a reasonable estimate of enrollment is that of those entering primary school (32,493 in 1952; 59,086 in 1970), 44% complete 6th grade; 30% enter secondary school, and 22% complete the first cycle; 14% enter the second cycle, and 9% complete it; 6% enter the University, and 0.7% complete it (386 graduates in 1967). Of course, these figures do not merely represent dropouts, as there are terminal degree programs in both cycles of secondary school. However, 70% of the students never make it to secondary school, and there are still large problems of dropouts and repeaters even in the secondary schools.

Part of the reason for the large attrition rate is that there are simply not enough schools and teachers to go around. Private schools are already handling a substantial part of the burden, especially at the secondary level, where they account for over 40% of the total enrollment. However, tuition costs alone put private schools out of the reach of most families. Clearly, the expansion must come in the public system.

Sufficient numbers of primary teachers have been trained so that a 1:30 teacher-pupil ratio exists. Secondary level teachers are required to have university training and are therefore in much shorter supply. In 1970, there are only one-fourth as many secondary teachers as primary teachers. Not only does this mean less favorable teacher-pupil ratios, but also it means that secondary teacher training must be greatly expanded if efforts are made to expand enrollment.

All of the schools' problems are highly aggravated in rural areas. Because teachers are so reluctant to live in these areas, there is a great shortage even of primary teachers. Many rural primary schools do not offer a full curriculum, thus depriving students of the chance of earning a primary degree.

Furthermore, the education provided is of overall low quality. In addition to the shortage and often poor training of teachers, there is a decided lack of teaching materials, especially textbooks. There are fewer classrooms than teachers. In urban areas, the classrooms are often in decrepit rented buildings. In rural areas, they are shacks which are health hazards. The subjects taught are traditional and academic, usually with little relevance to the student's life. The teaching consists almost entirely of assigning rote memory work. In short, the education is simply not interesting or useful to many students. Consequently, lower schools fail to attract and hold students who are needed as workers for their families.

From the viewpoint of a manpower policy, education should both train students to fill the short-term needs of the economy and equip them with a general background so that they may adapt to changes in the economy. The Panamanian educational system has functioned haphazardly in this respect.

One problem is that the educational system does not enroll or hold enough students to be a really effective link in a manpower program. If only 22% of the students who begin primary school finish the first cycle of secondary school, then the school has had little or no effect on the occupational preferences of 78% of the children of this age.

A second problem is that receiving an education does not always qualify the students for a job. In particular, the academic secondary education has produced too many students qualified only to fill the already crowded minor positions of government and business. This problem has been particularly acute at the University where studies have been concentrated in fields peripheral to the country's social and economic development. Degrees in Humanities and Law are prestigious for the students but costly to the country.

In 1969, four educators from the Pennsylvania State University submitted The National Plan for Education, 1968-1983, the result of an extensive study requested by the Ministry of Education. This plan is the first attempt to tie education more systematically and successfully to national development. The major recommendations of the plan deal with such matters as reorganization and professionalization of the whole educational system, expansion of facilities, changes in the content and quality of the education provided, and efforts to improve rural education.

The main thrust of the plan is that education must become a strong link in a national manpower policy. However, the plan's authors note that manpower projections for Panama are vague and general. It is estimated that with increasing urbanization, demand for agricultural labor will lessen. Nevertheless, agriculture will still be the single largest occupation; in general, the greatest demand will be for skilled workers, technicans, and professional workers as opposed to unskilled workers.

The national plan urges the education be greatly expanded to give a basic education to all groups of the rapidly increasing population and that more emphasis be placed on filling the projected demand for professional, technical, and skilled workers. These recommendations are backed by a recent report of the Inter-American Committee on the Alliance for Progress (CIAP) which recommended vocational education to fill short-term needs and basic education to prepare for long-term needs.

The plan's authors envision that all children from the ages of 7 to 15 be enrolled and kept in school. They urge that the first cycle of primary school be compulsory and that it stress exploration of the many job possibilities without forcing the student to commit himself to specialized training. The second cycle of secondary education would then be the time when the student makes his choice of occupation.

A program of guidance counseling would help the student to make that choice with a knowledge of his abilities and of the needs of the economy. The plan recommends de-emphasis of academic training and expansion of opportunities for vocational training. Admissions to the University would be made selective in order to cut the huge attrition rate, and more emphasis would be given to previously neglected crucial fields.

The plan's strengths and weaknesses both stem from the very general nature of its recommendations. On the one hand, the plan recognized that manpower projections are vague and that the demands for certain occupations are likely to change as Panama develops. The plan wisely refrains from adopting arbitrary quotas of how many students should be trained for each occupation. On the other hand, the success of the plan in making education a part of a manpower policy rests with the hope that students will choose key occupations if given a general educational background and the guidance provided by one counselor assigned to every 250-300 students. The likelihood of providing such a counseling resource seems minimal. The effectiveness of this process will determine the plan's usefulness.

Implementation of this plan will be difficult in any case. Major improvements in education will involve such delicate political matters as political stability, a greater degree of professionalism and autonomy for the Ministry of Education, and some administrative decentralization. A successful plan will require a commitment to keep education relatively separate from politics.

The plan will furthermore require increased expenditures, almost doubling the current educational budget by 1983. On the one hand, if the economy grows at the projected rate of 7% annually, education will require proportionally less of the Gross Domestic Product and the National Budget. Also, rising costs will be mitigated somewhat by external assistance and the planned redistribution of present educational expenditures. Nevertheless, the plan requires large initial outlays of capital and a dependable stream of increasing financial support.

Observers of Panama point out that education is highly regarded in Panamanian society. Parents seek education for their children because it means increased economic and social status. This feeling is reflected in the fact that 20-25% of the national budget has been devoted to education in recent years. More funds will be needed in the future, but the more important and more difficult task will be to improve the quality and focus of Panamanian education so that an expanded educational system can really be a force for the country's development.

THE COST OF DISEASE

In order to demonstrate the impact of a disease upon a society in ways other than by listing cases and deaths attributable to the disease, it is of value to estimate the many

costs to the society and to the government that arise as a result of the disease. These costs include the following:

I. The direct costs of the prevention, diagnosis, and care. This includes private, governmental, and international expenditures.

II. The indirect costs of lost wages and lost productivity. These costs are computed by using low, middle, and high estimates of man-days of labor lost and equivalent wage values, making assumptions about the relative value of male and female labor, adding refinements about real value of wages lost for city workers, and using more realistic assumptions about length of working days and working weeks.

III. The indirect costs attributed to increased caloric needs of all the population, working and non-working. Caloric needs reflect the needs for basal metabolism plus an increment attributed to fever and disease process. The model used is that developed by the Institute for Defense Analyses.

IV. Indirect costs attributed to loss of potential earnings because of premature death.

V. Indirect costs attributed to government investment in individuals who have not reached a productive age and who die as a result of disease. Investments include education, childhood medical care and other programs identified as as directed at children, e.g., school lunch programs. As a result of disease, these investments are lost.

VI. The indirect costs to the government through Social Security payments. In the body of the paper these costs have been calculated for tuberculosis, enteric infections, and malaria. The method for calculating the costs of II, III, and IV are given below for tuberculosis.

Indirect Costs of Lost Wages and Lost Productivity:

1. Working-age population with the disease:

Determine the working population afflicted with tuberculosis. There is no data available which states the exact number in the working population with the disease. There are, however, two methods for estimating the number of cases, one method produces the low estimate and the other the middle estimates.

a. To acquire the low estimate, use the available data on the age distribution of reported cases of tuberculosis. (Table 13) This data represents only 11% of the total cases of tuberculosis reported in 1965 (1,354 of 11,600 cases reported). If the working-age population is estimates as lying within the age range 15-49, plus one-half of the population 50 and over (to approximate the age range 50-65), then 53% of the reported cases as identified by age in 1965 lie within this population accordingly defined as working age. If the 10% sample of cases of tuberculosis reported by age is essentially randomly selected and representative of the total population with tuberculosis, and if the above estimation of the all reported cases of tuberculosis lie within the working-age population.

If physicians tend to selectively report infants, children, and young teenagers; or if children with tuberculosis are identified, treated, and reported selectively; then the 53% estimate is considerably lower than the true state of affairs and hence a very conservative estimate. If cases of tuberculosis are identified and reported through a system such as screening at the place of employment, factories, etc., then the 53% estimate may be inflated and does not demonstrate the true distribution of tuberculosis among the young. It is our belief that the 53% estimate is fairly reasonable, and if anything, tends to understate the prevalence among the working-age population. This range is repeated in Table 1, which presents similar data for 1966. If we accept this

estimate and assume that the age distribution characteristics for reporting of tuberculosis were the same in 1968 as in 1965, then we can estimate the number of cases of tuberculosis in the working-age population for 1968 by the following: (number of reported cases of tuberculosis, 1968) X (53%).

b. To acquire the middle estimate, use the data from Table 15, excluding primary infections, in the belief that most primary infections occur before age 15, and excluding extra-pulmonary infections, since these are primarily gastro-intestinal infections associated with milk ingestion in the young. From this, then, is obtained an estimate of remaining cases, primarily within working-age population. Eighty percent of all cases fall in this category.

c. Comparing the above two estimates (53% and 80%) for the working-age population with tuberculosis to the figures of those in the same range who die from the disease demonstrates that the estimates are conservative. For 1968, 66-70% of all TB deaths occurred in the working-age population. This indicates that our estimate of 53% is extremely low and that 80% is at best moderate, as case fatality is believed to be lower in the working-age population.

2. Sex distribution of population with the disease:

There is no data available for the sex distribution of tuberculosis in the population. It is assumed that cases of tuberculosis are roughly equally distributed between males and females, as deaths from TB occur with equal frequency for both sexes. In the absence in Panama of specific industries and occupations that correlate highly with the development, spread, and complication of respiratory tuberculosis, which might otherwise result in a male preponderance of the disease, equal distribution is a reasonable assumption.

3. Economically active population with the disease:

It should be noted that we have been discussing cases in what has been defined as the working-age population. It is now necessary to refine the concept to allow for those in the working-age group who are not defined as economically active, or who although economically active, are unemployed. Although unemployment is especially high in the urban areas of Panama City and Colon, average figures for the Republic will be used here.

a. For the estimate of the "economically active, employed," the estimates generated in the section "Labor Force" will be used. Accordingly, since approximately 60% of those in the working-age group of 15-65+ fit the category "economically active employed," the number of cases in the population of working age will be discounted by 40% to identify those with disease who are economically active and employed.

b. It can be estimated that females are equal to approximately one-fifth of the labor force. This is developed from distribution data for those classed as economically active minus the unemployed, comparing male and female. Data for the whole Republic of Panama in 1968 shows 88.0% of males in the working-age population economically active, 4.5% unemployed: thus, 83.5% active employed males; and 33.8% of females in the working-age population economically active, 13.3% unemployed: thus 20.5% active employed females. Accordingly, to estimate the total number of cases within the employed working-age group from reported cases of tuberculosis, and assuming equal sex distribution of cases, the estimates would be reduced to 5/8 of the total estimated cases within this age group. (All males X 1/2 + 1/4 females X 1/2 = 5/8)

The estimates generated using this figure of approximately 60% represents a rock bottom value for labor lost, when the labor is identified as employed (salaried) labor. This ignores any economic value that might be ascribed to unpaid family agricultural labor, marketplace selling, housework, or raising of children. A more moderate estimate of the value of labor would assume

that in the majority of families, women have an economic value equivalent to the minimal wage of males. Judging the pattern of Panamanian society, this is a reasonable assumption.

4. Work disability due to the disease:

It is assumed that the minimum disabling febrile period for a case of tuberculosis is 90 days. A more reasonable and very moderate estimate is 180 days. In fact, most cases will produce a full year's disability.

5. Time loss due to the disease:

The working day is assumed to be eight hours. The working week may be five or six days; the latter is more reasonable and still conservative, especially for agricultural workers. Estimates of time loss due to the disease are figures using the above information: 5/7 X 90, 5/7 X 180, 5/7 X 365, or 64, 128, 259 days respectively; or 6/7 X 91, 6/7 X 180, 6/7 X 365, or 77, 154, 314 days respectively.

6. Estimates for number of cases:

There are six possible choices of work days lost because of TB disability, and each of these six choices can be applied to the low and moderate estimates of cases as described in items 1a and 1b above for a total of twelve combinations. If females are discounted, excepting those in salaried positions, as in item 3 above, an additional twelve possible estimates are generated, for a total of 24.

Using the estimate defined in 1a above, 53% of 10,717 cases (total reported cases for 1968) equaled 5,680 cases of tuberculosis in the working-age population. If this estimate is reduced according to the rationale in 3 above, to account only for those economically active, employed, a rock bottom estimate of cases for 1a is 5/8 X 5,680 = 3,578 economically active, employed cases. Similarly, using the estimate defined in 1b above, 10,717 - (1,735 + 260) = 8,722 cases in the working-age population. (Total reported cases for 1968 minus primary infections and minus extrapulmonary infections = estimated cases in working-age population.) The estimate for those economically active, employed is 5/8 X 8,722 = 5,495 cases--the rock bottom for estimate 1b. The range of estimates of cases, then, can be presented as follows:

X = minimal estimate (employed only, female discounted)

Y = moderate estimate (all working-age population females equivalent)*

	X	Y
Low estimate of cases: 1a	3,578 cases	5,680 cases
Moderate estimate of cases: 1b	5,495 cases	8,722 cases

7. Man-days and years of labor lost due to disease:

Using the assumptions about work disability stated in 4 and assumptions of duration of working day and working week as in 5, twenty-four estimates of work loss can be generated. The lowest possible estimate of 3,578 cases working an eight-hour day, five days a week and suffering the shortest disability of 90 days provides a minimal estimate of 3,578 X 64 = 228,992 man-days of 677 man-years of labor lost. A more reasonable estimate of 5,680 cases suffering a disability of 180 days and assuming a six-day work week provides an estimate of 5,680 X 145 = 823,600 man-days or 2,265 man-years of labor lost. Still a very conservative estimate.

* Females can be accepted as economically equivalent because it is felt that they have an economic value for the agricultural and domestic work which they perform. The U.S. value for this approximates two-thirds of the average per capita income, and is generally felt to understate the value of these services.

It should be observed that 627 man-years represents approximately .15% of the total work available (627/439,000) by the economically active, employed population, and that 2,256 man-years represents approximately .3% of the work potentially available from the over-15 population.

The many possible estimates of loss of man-years are presented in Table 23a with varying estimates of a number of cases, work weeks, and durations of disability. Man-years for this Table are calculated on the basis of 365 days (rather than the traditional 260 as in the U.S. or some other estimates for Panama). In this instance, figures understate the labor loss rather considerably.

The range of loss presented in the Table is over tenfold with a minimum of 627 man-years, and a maximum of 7,501. It is felt that even the maximum estimate presented is not excessive or unreasonable and probably represents a realistic picture for the society. The range for the middle disability estimate of 180 days is only threefold, from 1,252 man-years to 3,663 man-years. These are certainly very conservative estimates for the work loss and will be used for the computation of dollar costs, along with the lowest and highest figures.

8. Dollar value of lost wages due to the disease:

To convert labor time lost into dollar value of lost wages, it is necessary to estimate appropriate wage rates. For agricultural workers, the minimal wage rate of $2 per day was set in January 1965. In Panama City and Colon, minimum hourly wages range between 40-60 cents, with almost all hourly wages over 50 cents, with most between 25 and 35 cents. Accordingly, for an 8-hour work day (a low estimate), the conservative estimate applicable to all is $2. If it is assumed that most cases reported are locaated in Panama, Colon, or certain other urban areas where average minimal wages are considerably higher, then the minimum daily wage ranges from $4.00 to $4.40. For these purposes, the two wage values, a low estimate of $2 and a moderate estimate of $4, will be used.

Using estimates of a daily wage of $2, and the estimates of man-years of labor lost as presented in Table 23a, estimates are made of wage dollars lost which can be attributed to tuberculosis. (Table 23b) The minimal estimate assuming shortest disability period, shortest work week, lowest number of cases, and discounting unpaid female labor approximates $440,000 for 1968. Assuming a more probable disability period of 180 days, while the other assumptions remain unchanged, provides an estimate of approximately $914,000. A more reasonable estimate assumes a disability period of 180 days, a work week of six days, and accepts females as economically equivalent.

The wide range of possible values is readily observed in the Table and shows the varying impact of the many assumptions. It should be emphasized that none of the assumptions is liberal, and even under the most strignent of criteria, the hidden cost of the disease is considerable. It is felt that the moderate estimate using 180-day disability and a six-day work week resulting in a loss of $1.75 million represents a conservative realistic estimate of the hidden cost of the disease based upon a national minimum wage scale. In urban areas, or for selected occupations where the hourly wage is considerably higher, these costs could be even doubled and not be unreasonable or improbable.

Indirect Costs Attributed to Increased Caloric Needs:

These costs estimates are based upon a model developed by Sheldon and Pollack for the Institute for Defense Analyses (IDA). This model recognizes that illnesses exact a caloric toll through accelerated metabolism. This acceleration occurs during both the febrile episodes and the pro- and post-dormal periods.

In those patients with borderline nutritional deficiencies, the control of chronic disease would allow more effective and efficient utilization of the limited available food supplies. In countries with an absolute deficit in food supply, the wastage of food as a result of disease further aggravates the deficit.

To determine the extent to which disease consumes available nutritional supplies, and thereby wastes food resources, energy losses associated with three disease processes have been estimated for illustrative purposes. Clearly, these will not represent all of the caloric wastage associated with disease in Panama. Tuberculosis, malaria, and dysentery have been selected for these estimates because of their prevalence in Panama, the investments that have been made in their control, and the availability of estimates of metabolic acceleration resulting from them.

The assumptions implicit in the IDA methodology are as follows:

1. Use of reported cases underestimates the disease load, but probably represents preexisting disease of sufficinet severity to be diagnosed and which will require some period of time before its arrest can be assured. These patients probably suffer the greatest nutritional deficits as a result of the disease.

2. Calculations of energy levels needed to maintain the living state (internal work) and to obtain the necessary food, clothing, and shelter (external work) have been made in accordance with experience and nutrition estimates in fifteen Latin American countries. The total caloric expenditures by the "standard man" is estimated at 2400 calories per day. The caloric expenditure for the maintenance of normal body temperature is approximately 2000 calories per day. The remaining 400 calories are used for external work and are available for sale. Obtaining the food supply for the next day (2400 calories) requires a caloric expenditure of 150 calories. An additional 250 calories are expended to provide shelter, clothing, and reproductive survival. This 2400 caloric nutrition is far less than the recommendations of the Ministry of Health (approximately 2800-3000 calories per day for an adult male) and allows relatively little for heavy labor.

3. For each case of disease, the metabolic requirements and dietary availability and requirements are in per caput terms, i.e., applicable to a standard man. Sufficient data are not available to permit age, sex, or ethnic specificity in these calculations. It seems reasonable to postulate even more significant effects for some population groups when such data become available.

4. Respiratory tuberculosis is assumed to be a disease of one year's persistence, three months of which include febrile episodes.

5. A single malaria case is assumed to include a ten-week series of paroxysmal episodes occurring three times weekly.

6. Dysentery includes salmonella, shigella, and amebic infections. (It is assumed that calculations of mid-range effects for typhoid fever also adequately model shigella infections serious enough to be reported.) Further, more persistent and repetitive diarrheal manifestations of amebiasis are considered the debilitative equivalents of the bacterial diseases. Each dysentery case is counted as a once yearly occurrence per individual.

Table 20 presents estimates of the percent metabolic increase during various phases of the disease process and a percent increment in basic annual caloric requirements per case as developed within the IDA model. For tuberculosis the annual increment is 19.8% per case. Data in Table 21 indicate the excess annual caloric consumption per case for each disease. For tuberculosis, this cost is 173,400 calories per case per year based upon an increment of 19.8% of 2400 caloric daily nutrition for 365 days. This value of 173,400 calories per case per year is sufficient to provide 72 man-days of full nutrition per case per year (i.e., 2400 calories of nutrition for 72 man-days). Another view is to consider the meaning of the 173,400 calories in the theoretical conversion of persons at borderline nutritional level (2000 cal/day) to working level nutrition (2400 cal/day). This we have called labor increment nutrition (400 calories). Seen in this way, the 173,400 calories of wasted annual consumption attributed to each case of tuberculosis is equivalent to 434 man-days of labor increment nutrition per case. Thus if undernutrition is the sole reason for some worker non-productivity, the prevention of a single case of tuberculosis could theoretically convert 434 man-days of non-productivity

into that many man-days of labor.

For the 8,722 cases of tuberculosis in 1968, the total excess annual caloric consumption is approximately 1.5 billion calories. This is sufficient to supply 3.8 million man-days of labor increment nutrition or 628,000 man-days of full nutrition (2400 calories). This wastage by tuberculosis is sufficient to provide full nutrition for more than 10,000 workers for two months.

Another approach to the caloric costs of disease is to consider the work calories expended in order to produce the 173,400 calories per case per year. This is based upon an input-output caloric conversion ratio of one to sixteen. As presented in Table 21, approximately 11,000 work calories are invested by the labor force to produce the 173,400 calories of food consumed by each tuberculosis patient. Since each worker is assumed to have only 400 calories per day for sale (labor increment nutrition), each case absorbs 27.5 days of this saleable labor per year. The total requirement for labor investment to produce the 1.5 billion excess calories annually for the 8,722 cases of tuberculosis is approximately 240,000 man-days. It is emphasized that from the viewpoint of the worker, this is not wasted labor, for he has produced a marketable produce from which he receives his livelihood. From the viewpoint of society, these 240,000 man-days of labor leeched from an already poorly nourished society produce food which is not effectively utilized for progress and development but is instead essentially wasted. This is an important loss in a situation in which approximately 15% * of the population already suffers from inadequate food supply.

The excess caloric consumption by the 8,722 cases of tuberculosis in 1968, approximately 1.5 billion calories per year, can be translated into terms of food demand placed upon the agricultural production system or the market place. The staple crops of wheat, rice, and corn provide 3340 cal/kg., 3570 cal/kg., and 3560 cal/kg., respectively. The caloric demand of 1.5 billion calories is supplies by approximately 500 metric tons of wheat, or by 470 metric tons of either rice or corn. At current yield rates per hectare for Panama, approximately 635 hectares of corn or 400 hectares of rice would be needed to produce the above amounts. Since wheat is not produced in Panama, all wheat consumed must be imported. At United States wholesale prices (1968, which would be lower than import prices for Panama), the cost of corn at $50/ton would be approximately $22,000 and for paddy rice at $110/ton would be approximately $50,000.

The above calculations provide low estimates of value, acreage, or weight of food staples which are wasted because of disability from respiratory tuberculosis. The cost estimates assume that imported food staples represent the least possible costs. They are misleading as they represent satisfaction of food needs through the application of the single, cheapest staple, without regard to quality and composition of the diet, and also disregards the realities of the nutrition and resistance to and recovery from disease.

Food cost estimates based upon a balanced diet are considerably higher. The 1970 Ministry of Health Nutrition Report for Panama estimated the daily dietary cost in Panama City at approximately 50 cents per person per day. At this rate, the excess food costs for the tuberculosis patient is approximately $36 per year. For the 8,722 patients in 1968, the total excess food costs to the ill were approximately $314,000.

The conclusion that it might be less expensive to ignore this disease cannot properly be made in the face of the foregoing food cost estimates. The total direct and indirect costs of the disease must be calculated and then compared with the costs of control before such a desicion could be reached. In a country with suboptimal nutritional status and limited nutritional resources, the implications of nutritional wastage command attention. In addition, some projection of the future risks of spread of the disease must be made. Simple feeding of the disease by importation or increased domestic production of food may do little for future populations, while eradication has continuing benefits.

* Estimate based upon a household nutrition survey conducted by the Ministry of Health, published in 1970.

Indirect Costs Attributed to Loss of Potential Earnings Because of Premature Death:

Data presented in Table 24 show the distribution of respiratory tuberculosis deaths for males in the year 1966. Assuming that deaths within the working age population represent a net loss to the economy in terms of productive years of life and loss of potential earning, it is possible to estimate the magnitude of this loss. This estimate is calculated in the following way:

1. Assume that the working age population lies between the ages of 15-65

2. Use the estimated male life expectancy for 1960 of 59.8 years, approximately 60 years in 1966.

3. Identify the conservative estimate for the assumed average age at death for each interval (i.e., 17 years of age in the age interval 15-19), subtract the assumed average age at death from 60 to obtain the estimated number of years of life lost per individual.

4. This latter figure, when multiplied by the number of individuals within each age group provides an estimate of the total number of years of potential labor lost per age group. Using estimates of $2 per day (minimal wage estimate) and 6 days labor per week, equaling $624 per year, the potential wage losses per individual and per age group are calculated. (Table 24)

From the above methodology, it is estimated that the male deaths from respiratory tuberculosis in 1966 accounted for a potential loss of 1440 man-years of labor, which is equivalent to a minimum loss of $900,360 in potential wealth generated. If female deaths were to be similarly valued, their losses could also be calculated. These represent losses caused by death only for the one year, 1966. Similar losses recur for subsequent years in even greater numbers. These economic losses have estimated primarily for illustrative purposes. Their worth discounted to present value has not been calculated for this purpose.

In using estimates of potential earnings which are lost because of premature deaths, certain basic and critical assumptions are made. The most important of these is that if the death can be prevented, and/or if the disease can be prevented, that the individual will have a life experience comparable to the "average male" and should meet the average male life expectancy of 60 years, and that during this time will have the potential to be at least as productive as the minimal wage-earner. This assumption may not be correct except for certain diseases and causes of death. The fact that a man contracts tuberculosis which eventually becomes fatal, while many others do not, may suggest that he is in some way different from his fellow males--he may be at high risk with low resistance, poor hygiene, and poor nutritional status.

In this instance, prevention/cure of tuberculosis may merely allow the substitution and manifestation of another equally severe disabling, and eventually fatal, disease. Consequently, he may never meet the life expectancy of his peers or equal their economic potential merely by health action limited to tuberculosis. Therefore, ascribing lost potential earnings by premature death to a specific disease may not be entirely useful, although the potential earnings are indeed lost by premature death. It is here that it is essential to move beyond the categorical disease interests of tuberculosis and direct health action, into the sphere of socio-economic development to promote adequate nutrition, personal hygiene through education, proper housing, and industrial hygiene.

A SIMPLE COST BENEFIT MODEL: TUBERCULOSIS PREVENTION AND CONTROL

A WHO series of technical papers outlines the problems and potential benefits of tuberculosis control in developing countries and presents epidemiologic models of tuberculosis spread and control, computer-based resource allocation models, and cost-benefit studies. Another epidemiologic study has evaluated the feasibility of BCG vaccination as a means of TB prevention without prior skin testing. From these studies, the following conclusions can be reached about the BCG vaccination program in Panama referred to in the section on Immunization (p. 138).

1. A simplifed diagnostic/treatment approach combining examination of sputum specimens from chest-symptomatic patients could benefit only 5-10% of the active tuberculosis cases at any one time. This approach provides assistance to only a few of those in need. By reaching at most only 10% of infective cases, it cannot significantly reduce transmission. In a high-prevalence area, preventive activities can reach more of the population and effect greater control over the disease.

2. One effective preventive activity, especially in high prevalence area, is BCG immunization. BCG offers greatest protection against primary tuberculosis infections, rather than against the breakdown of old tubercular lesions of the lungs.

3. Because of the epidemiologic characteristics of tuberculosis and with an annual conversion rate of 1-2%, it would be necessary to vaccinate 200-300 children with BCG to prevent one case of active tuberculosis.

4. Assuming that BCG vaccination gives 80% protection and that 80% of the child population could be covered by a vaccination program, the number of cases could be reduced to one-third (1-[80/100 X 80/100] equals approximately one-third).

Of the 10,717 cases of tuberculosis reported in Panama in 1968, 1735 were pulmonary primary infections. (Table 15) If BCG vaccination could reduce the number of these cases to approximately one-third, this would mean the prevention of approximately 1100 cases per year. Using only the IDA minimal estimate of work wasted by increased caloric consumption, there would be an estimated saving of $176,000 (1100 cases X $2/day X 80 man-days of labor). If a high estimate of 300 children immunized per case prevented is used at a high cost per immunization of $0.30, the approximate cost of such an activity would be $99,000. The net saving of vaccinating rather than doing nothing to prevent the disease would be $77,000.

The 1735 cases are only those actually reported as primary infections and are probably a very conservative estimate of new infections. The WHO studies show that in high-prevalence, lesser developed areas, the majority (80%) of cases come from newly acquired infections. This is the reverse of experience in developed nations where the majority of active cases result from the breakdown of old lesions. As Panama is in a state of transition, it is reasonable to assume that approximately 50% of the cases are newly acquired infections. If this is true, the savings from BCG vaccination program would triple the above estimate.

If such a program were incorporated within a functioning health care system aimed at prevention and widespread immunization, the costs of operation should be reduced. The required time to cover the population and the annual population increase must also be considered.

The present program reported 31,956 vaccinations for 1967. Given an estimated "young population increase" of 50,900 for 1968, it is obvious that the program should be increased to provide adequate coverage. The result of an expanded program would be a decrease in the incidence and prevalence of the disease and a significant saving for the society.

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Rapport de Statistiques Sanitaires Mondiales - Vol. 22, No. 3. 1969.
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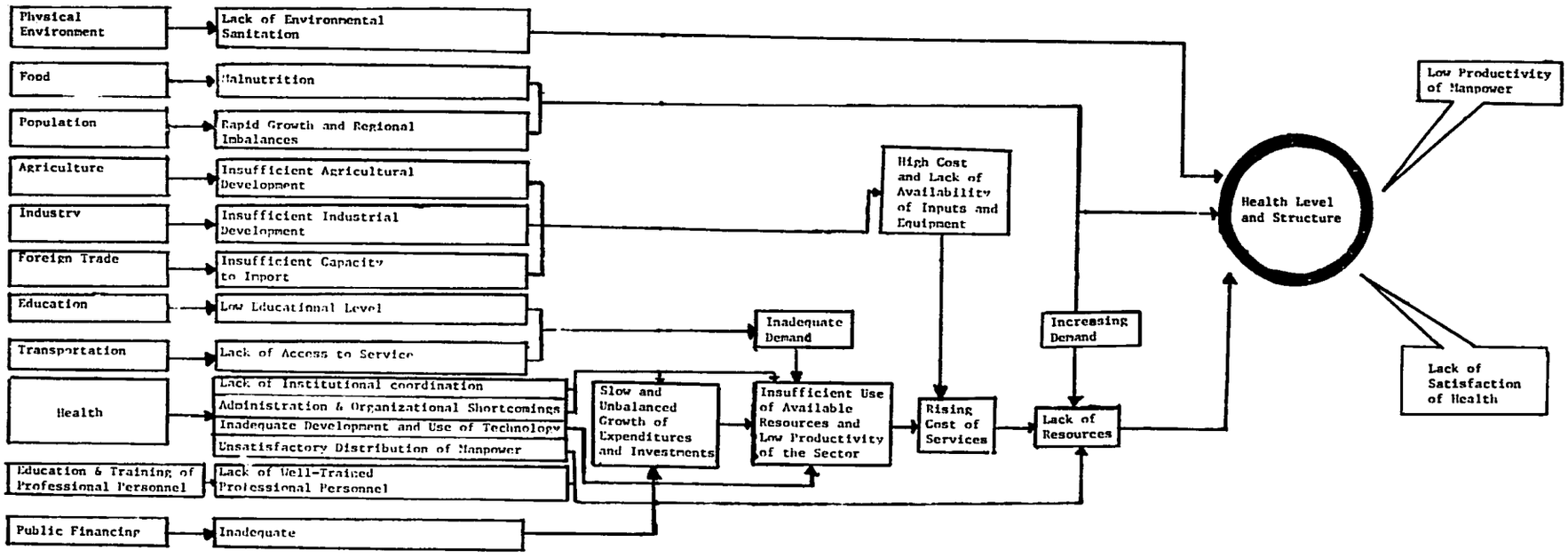
ILLUSTRATIONS

AND

TABLES

FACTORS DETERMINING THE HEALTH LEVEL AND STRUCTURE IN UNDERDEVELOPED COUNTRIES

Illustration 1



Source: PAHO Center for Health Planning

Illustration 2

NATIONAL WATER & SEWERAGE AUTHORITY (IDAAN)
WATER SUPPLY SYSTEMS IN THE REPUBLIC OF PANAMA CURRENTLY OPERATING AND UNDER CONSTRUCTION BY IDAAN

☆ operating potable water supply plant
☆ Potable water supply plant under construction
• operating wells
○ wells under construction

BOCAS DEL TORO
☆ BOCAS DEL TORO

COCLE
• PENONOME
• AGUADULCE
• NATA
• ANTON
• LA PINTADA
• POCRI DE AGUADULCE
• RIO HATO
○ FARALLON
○ EL ROBLE
○ EL CRISTO
○ EL JAGUITO

COLON
☆ COLON
☆ PILON

CHIRIQUI
☆ DAVID
• BENEDIOS
○ CONCEPCION
☆ PUERTO ARMUELLES
○ VOLCAN
• PROGRESO
• GUALACA
○ CERRO PUNTA
○ DOLEGA
○ ALANJE
○ SAN FELIX
○ SANTA MARTA
○ LAS LAJAS
○ BOQUERON

DARIEN
☆ EL REAL
○ CHEPIGANA
○ LA PALMA
○ YAVIZA
○ GARACHINE

HERRERA
☆ CHITRE
○ LAS MINAS
○ LOS POZOS
☆ LLANO BONITO
○ OCU
☆ MONAGRILLO
☆ PARITA
• PESE
○ SANTA MARIA
☆ LA ARENA
○ CHUPAMPA
○ PARIS

LOS SANTOS
• LAS TABLAS
☆ LOS SANTOS
○ GUARARE
• PEDASI
• POCRI DE LOS SANTOS
○ LA PALMA
○ MACARACAS
• PARITILLA
• SANTO DOMINGO
• SABANA GRANDE
• LAJAMINA
○ LOS ASIENTOS
○ LLANO DE PIEDRA

○ LA COLORADA
○ EL SESTEADERO - LA LAJA

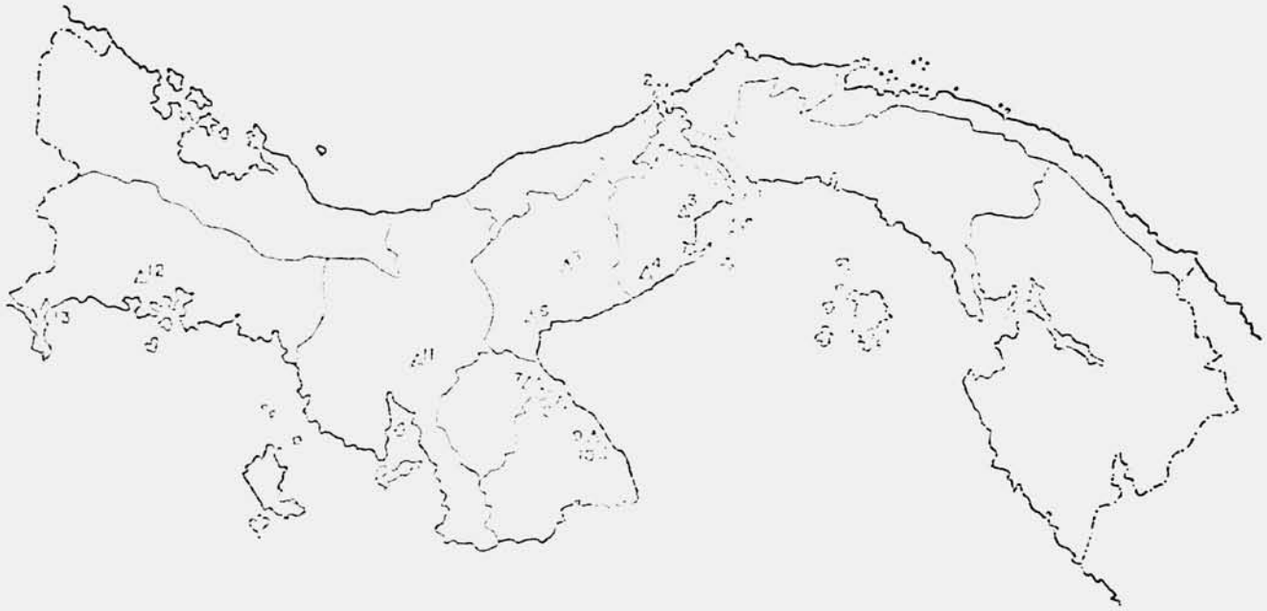
PANAMA
☆ PANAMA
○ ARRAIJAN
☆ CHORRERA
○ CHAME - BEJUCO
○ CAPIRA
○ CERMEÑO
○ SAN CARLOS
○ CHEPO
○ PACORA
☆ ALCALDE DIAZ
• TABOGA
○ LIDICE
○ SAN ISIDRO
○ SAN MIGUEL

VERAGUAS
☆ SANTIAGO
• RIO DE JESUS
• ATALAYA
• LA MESA
• SAN FRANCISCO
○ CAÑAZAS
• MONTIJO
○ SONA
• LAS PALMAS
• CALOBRE
○ LA COLORADA
○ LA PEÑA

SOURCE: IDAAN Annual Report, 1966

Illustration 3

NATIONAL WATER & SEWERAGE AUTHORITY (IDAAN)
AVAILABLE AND IMPROVED SEWERAGE SYSTEMS IN
THE REPUBLIC OF PANAMA



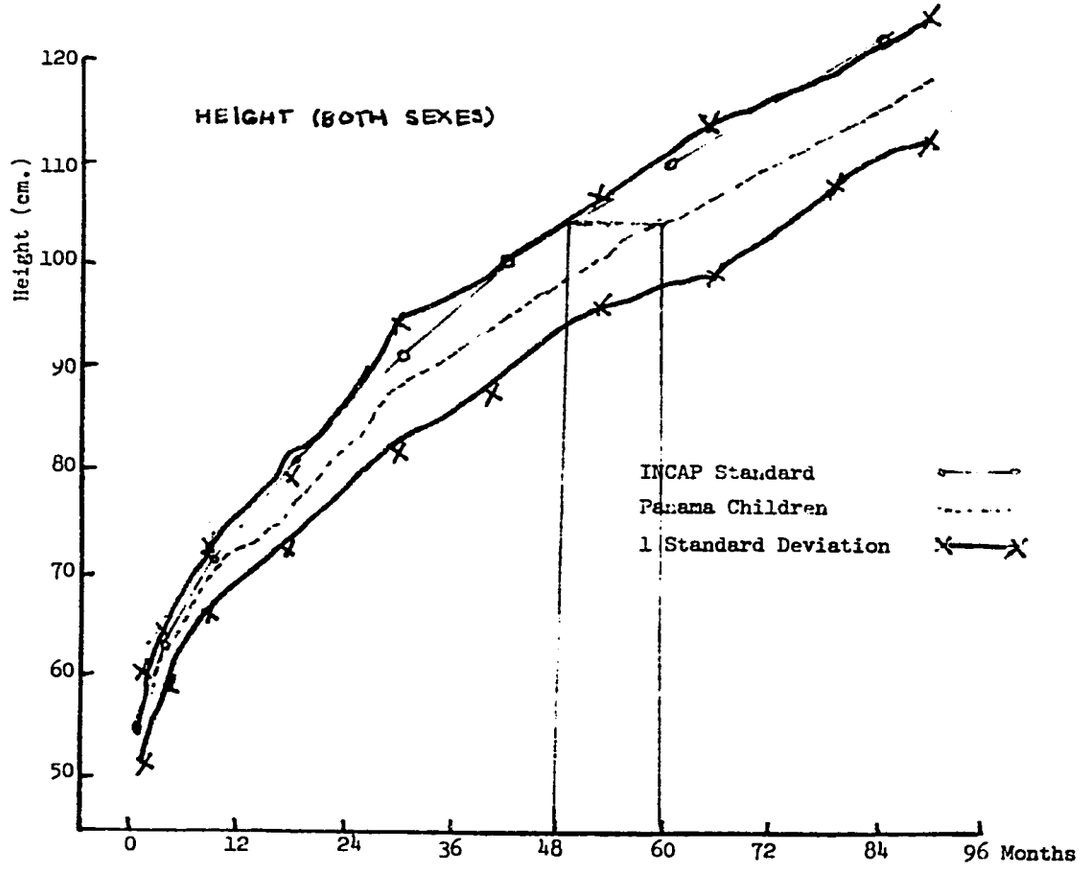
Δ Available Sewerage Systems
1 PANAMA
2 COLON
3 CHORRERA
4 SAN CARLOS
5 PENONOME
6 AGUADULCE
7 CHITRE
8 LOS SANTOS
9 LAS TABLAS
10 GUARARE
11 SANTIAGO
12 DAVID
13 PUERTO ARMUELLES

Δ Improved Sewerage Systems
2 COLON
7 CHITRE

SOURCE: IDAAN Annual Report, 1986

Illustration 4

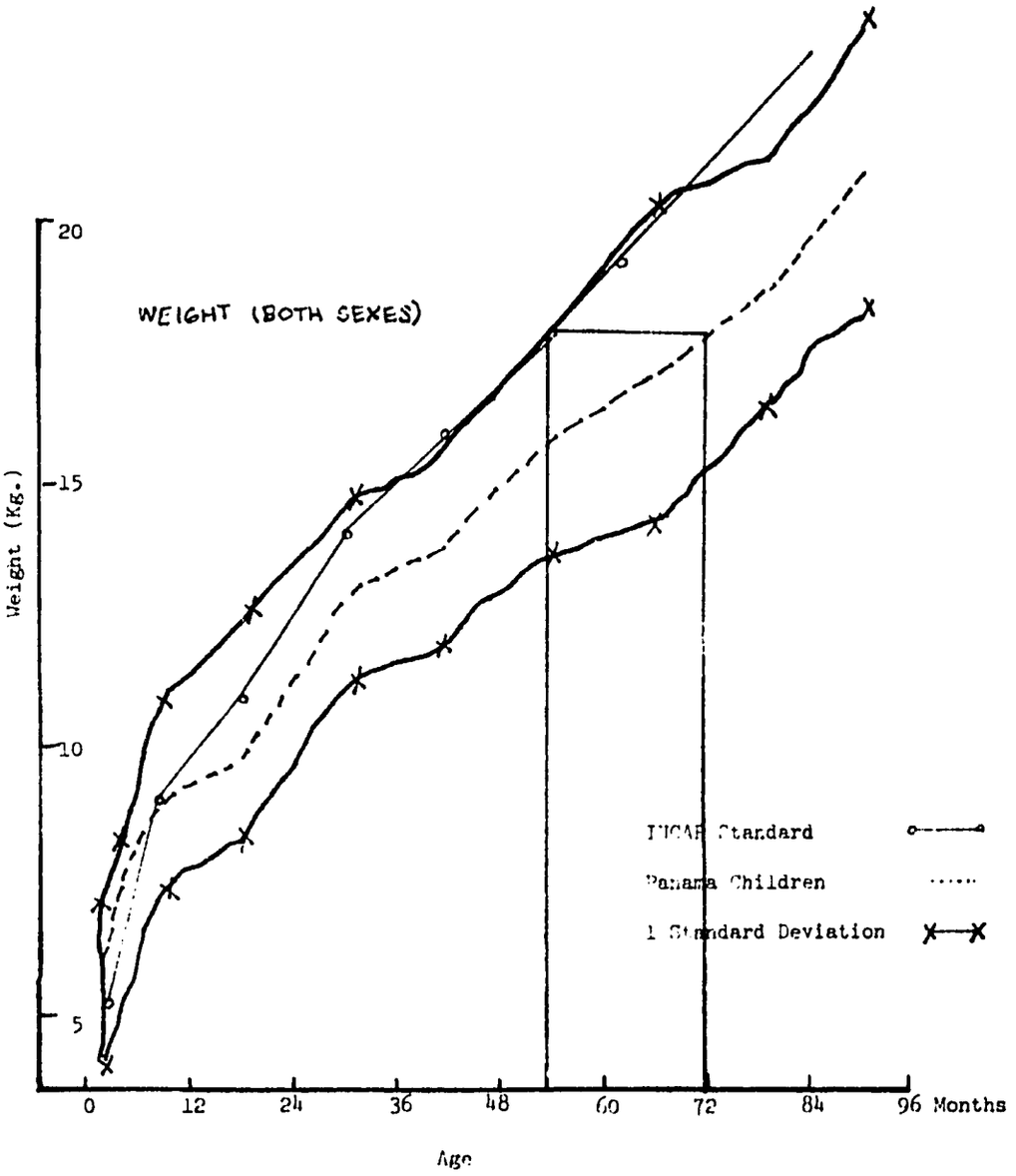
HEIGHT COMPARISONS OF CHILDREN IN PANAMA WITH INCAP STANDARD



Source: Nutrition Survey of Panama (INCAP - OIR)

Illustration 5

WEIGHT COMPARISONS OF CHILDREN IN PANAMA WITH INCAP STANDARD



Source: Nutrition Survey of Panama (INCAP - OIR)

Illustration 6

INDICES OF AGRICULTURAL AND FOOD PRODUCTION FOR PANAMA: TOTAL AND PER CAPUT

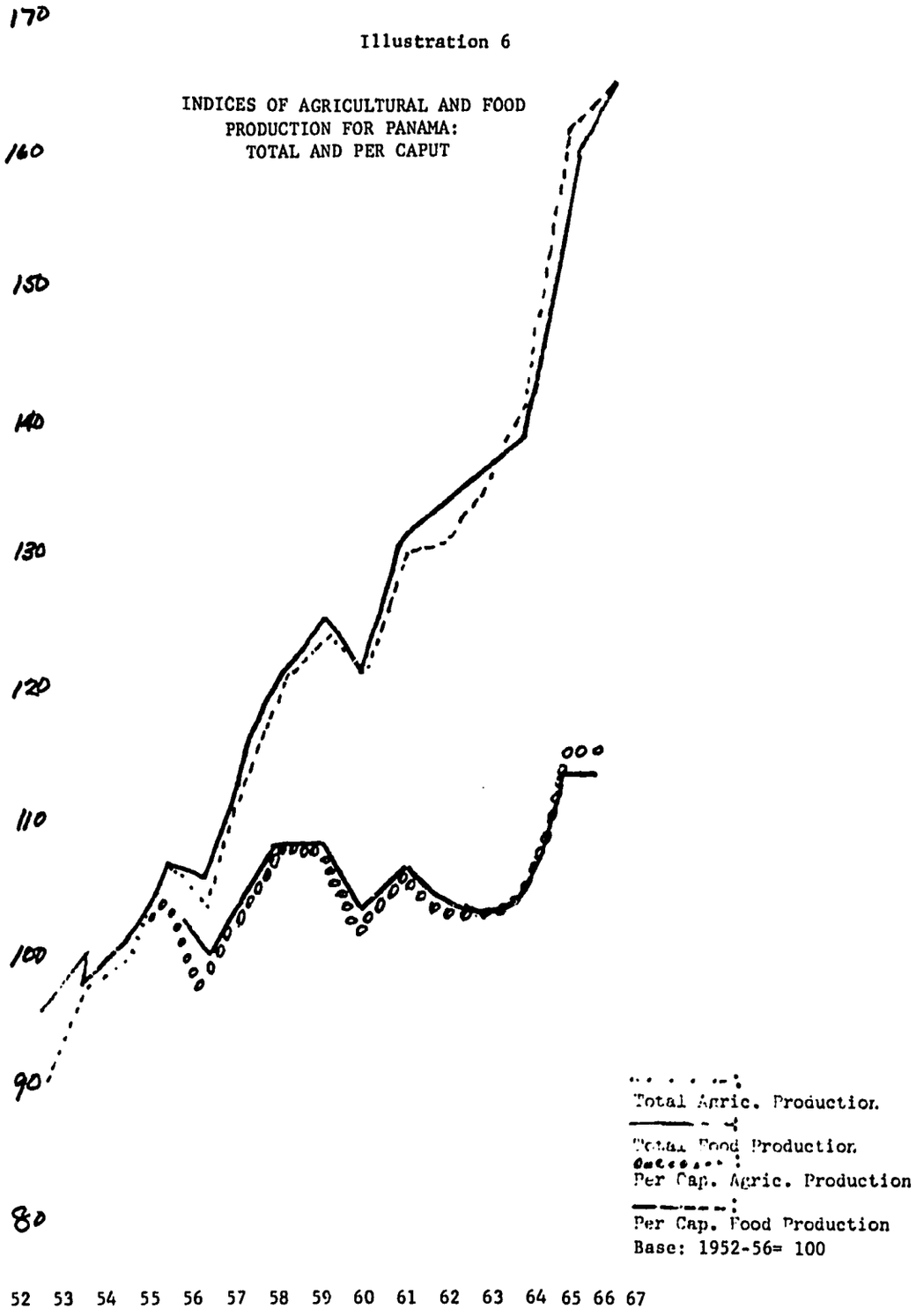


Illustration 7a

TOTAL YEARS OF SCHOOLING REQUIRED FOR COMPLETION OF THE MEDICAL DEGREE COURSE, BY COUNTRIES AND NUMBER OF MEDICAL SCHOOLS,* 1967

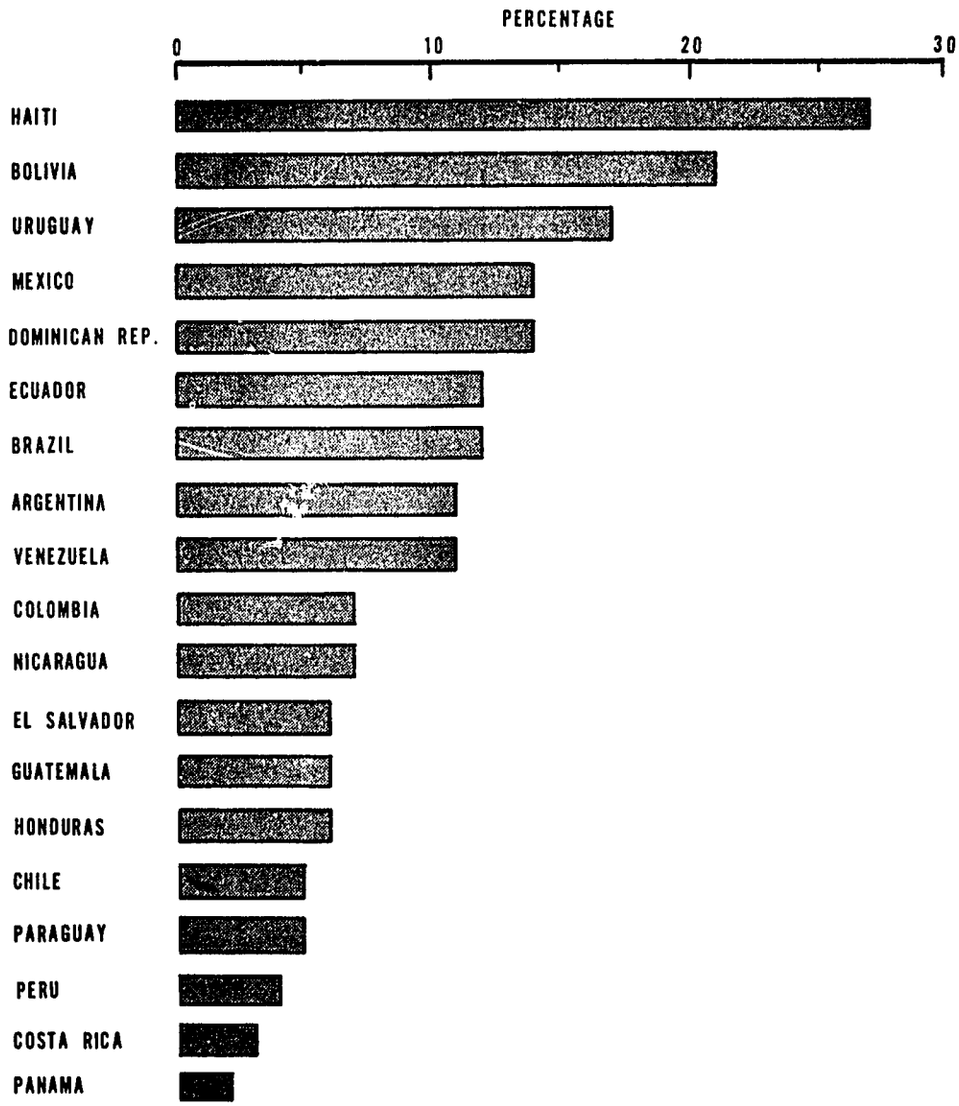
COUNTRY	TOTAL OF SCHOOLS	YEARS OF STUDY 0	17	18	19	20
ARGENTINA	9			4	5	
BOLIVIA	3				2	1
BRAZIL	31			31		
CHILE	3				3	
COLOMBIA	7			7		
COSTA RICA	1			1		
CUBA	2			2		
DOMINICAN REP.	1				1	
ECUADOR	3					3
EL SALVADOR	1				1	
GUATEMALA	1				1	
HAITI	1				1	
HONDURAS	1				1	
JAMAICA	1				1	
MEXICO	21		14	7		
NICARAGUA	1			1		
PANAMA	1				1	
PARAGUAY	1			1		
PERU	4				4	
URUGUAY	1			1		
VENEZUELA	6		6			
TOTAL	100		20	55	21	4

*Including primary, secondary, pre-medical, general and medical studies in medical schools with full degree courses

SOURCE: Pan American Health Organization

Illustration 7b

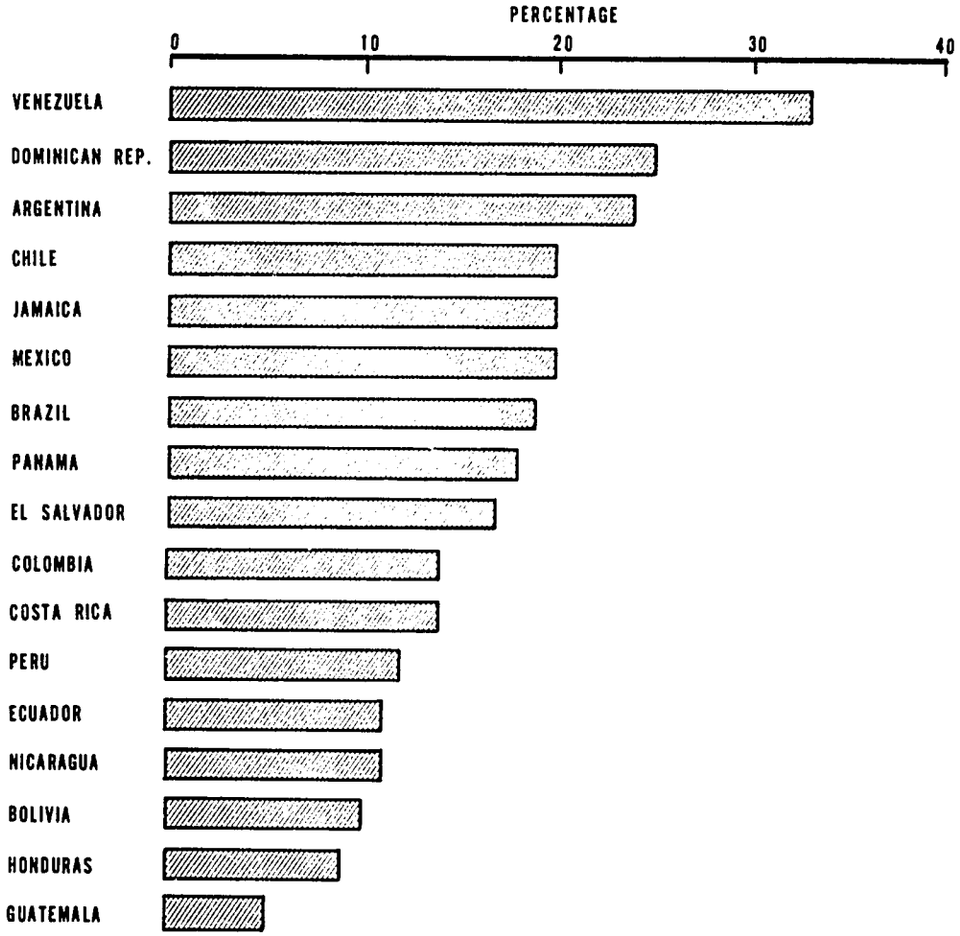
RATIO OF MEDICAL STUDENTS TO TOTAL MATRICULATIONS IN UNIVERSITIES AND INSTITUTIONS OF HIGHER EDUCATION (1967)



SOURCE: Pan American Health Organization

Illustration 7c

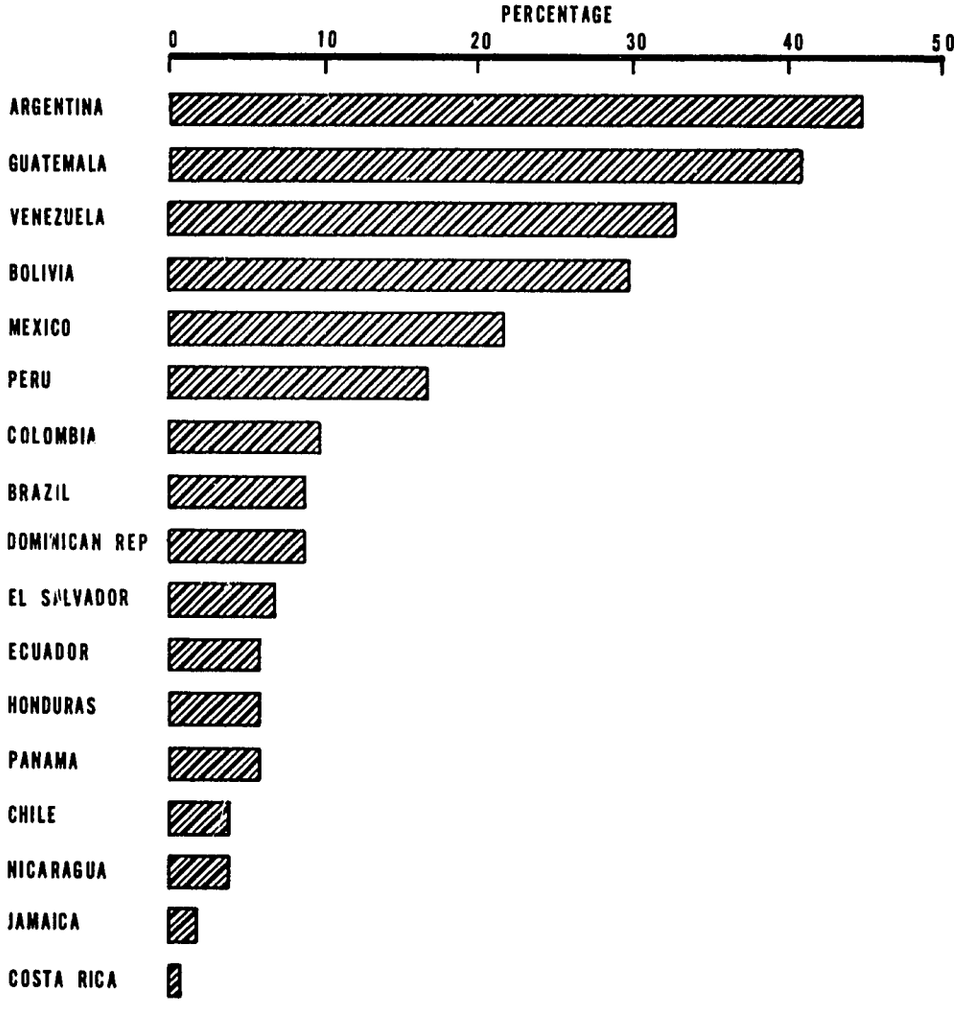
PERCENTAGE OF WOMEN STUDENTS OF MEDICINE, BY COUNTRIES (1967)



SOURCE: Pan American Health Organization

Illustration 7d

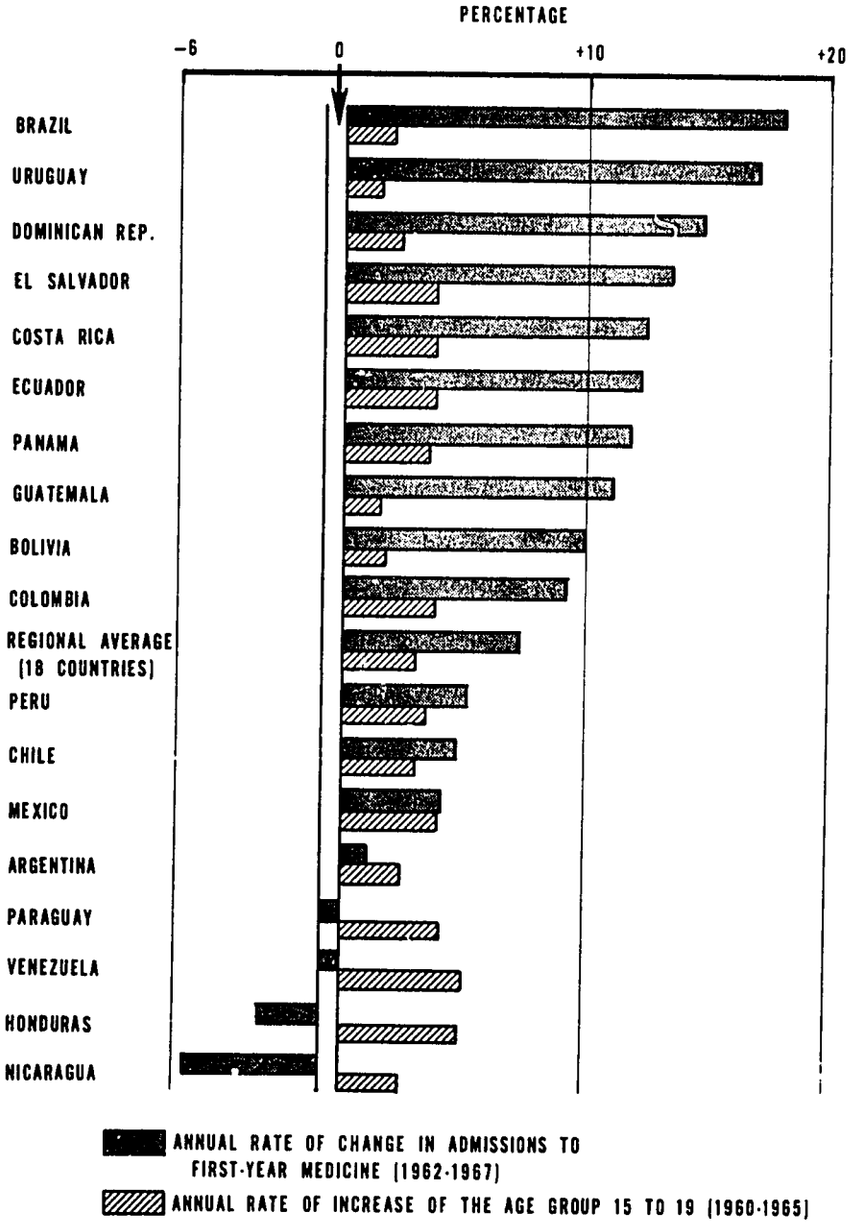
PERCENTAGE OF "IRREGULAR" STUDENTS , BY COUNTRIES (1967)



SOURCE: Pan American Health Organization

Illustration 7e

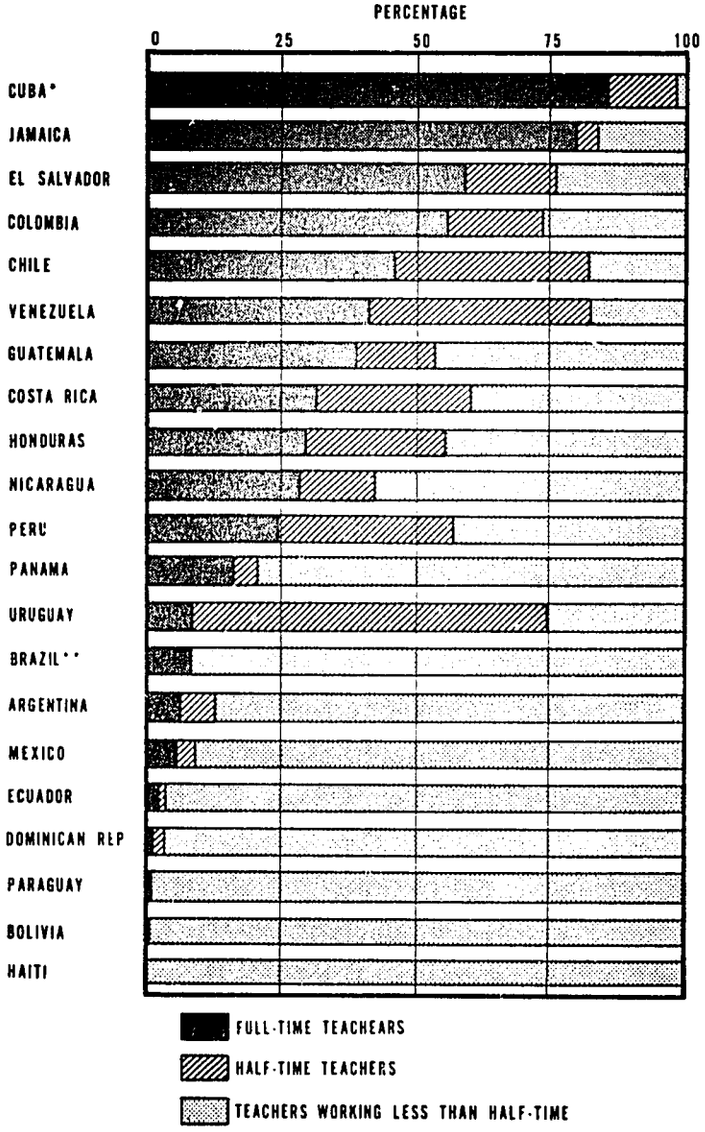
EVOLUTION IN THE NUMBER OF ADMISSIONS TO FIRST-YEAR OF MEDICINE (1962-1967) COMPARED WITH RATE OF INCREASE OF THE 15-19 YEARS AGE GROUP BY COUNTRIES



SOURCE: Pan American Health Organization

Illustration 7f

DISTRIBUTION OF MEDICAL FACULTY IN LATIN AMERICA BY TIME DEVOTED TO DUTIES (SCHOOLS WITH FULL DEGREE COURSES) 1967



*Data for 1965
**Includes only 24 of the 31 schools with full degree courses

SOURCE: Pan American Health Organization

ORGANIGRAMA DEL MINISTERIO DE SALUD

Illustration 8

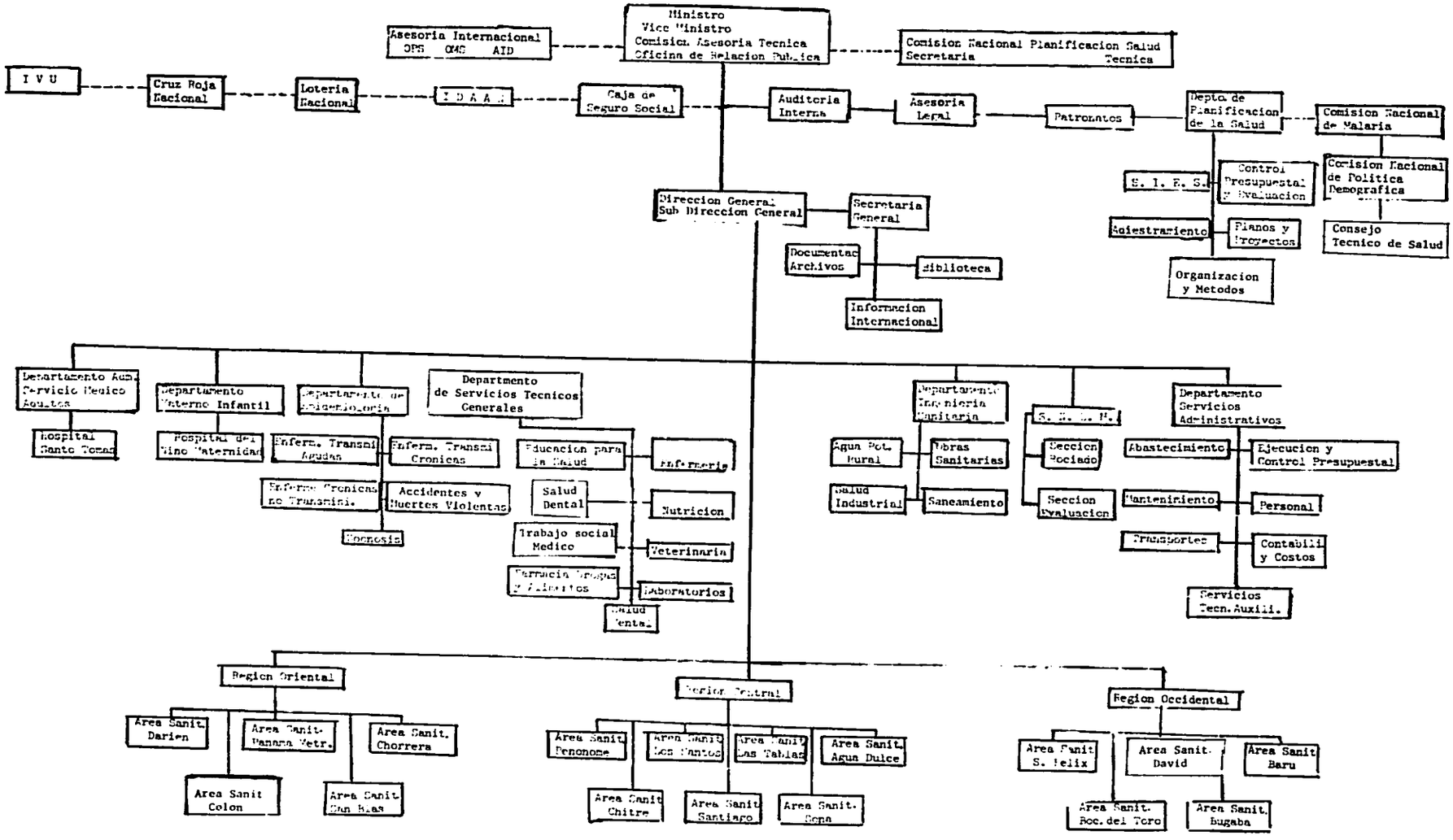


Illustration 9

CAJA DE SEGURO SOCIAL

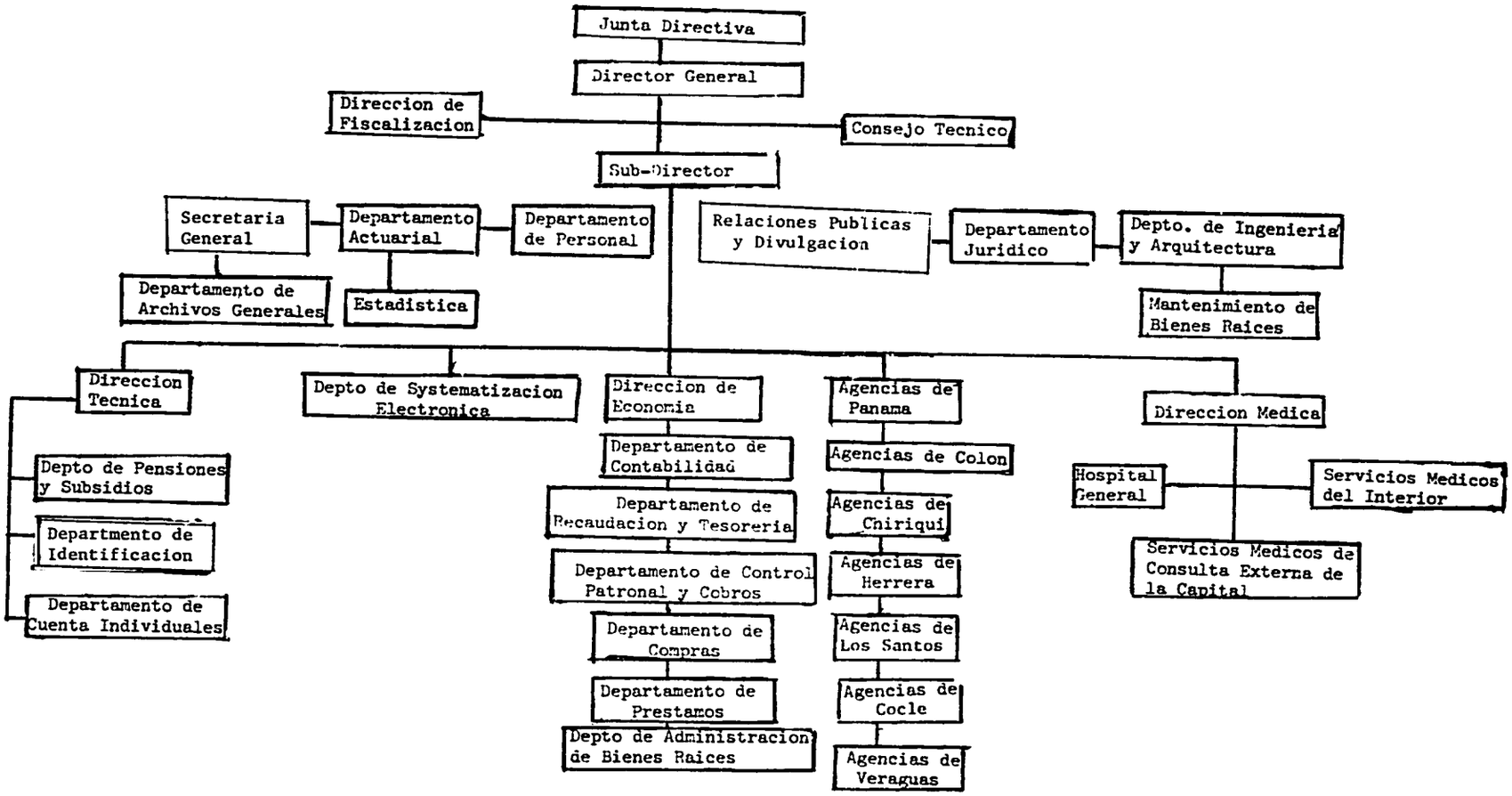


Illustration 10

INDEX NUMBERS OF RETAIL PRICES OF FOOD AND COST OF LIVING - USA PANAMA

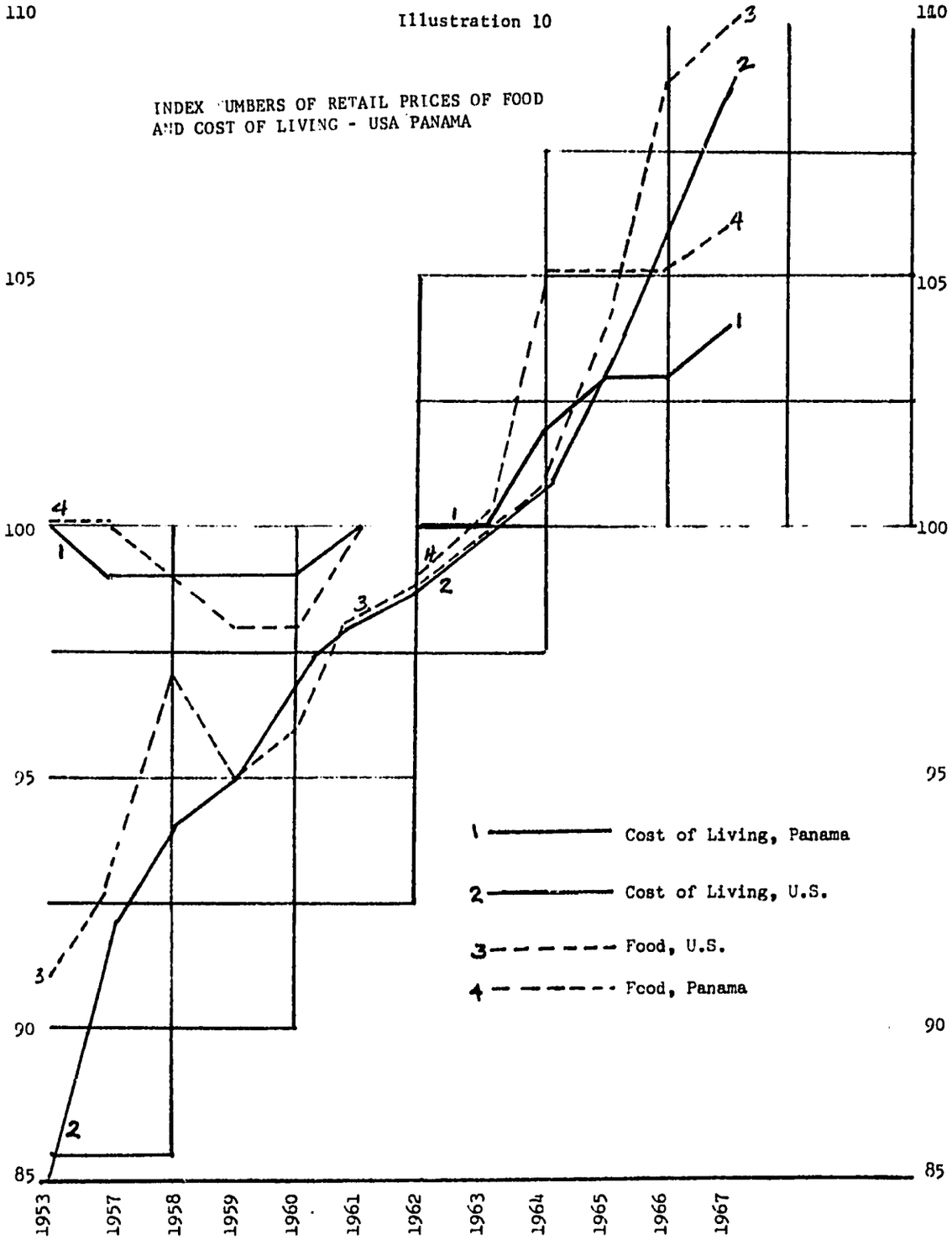
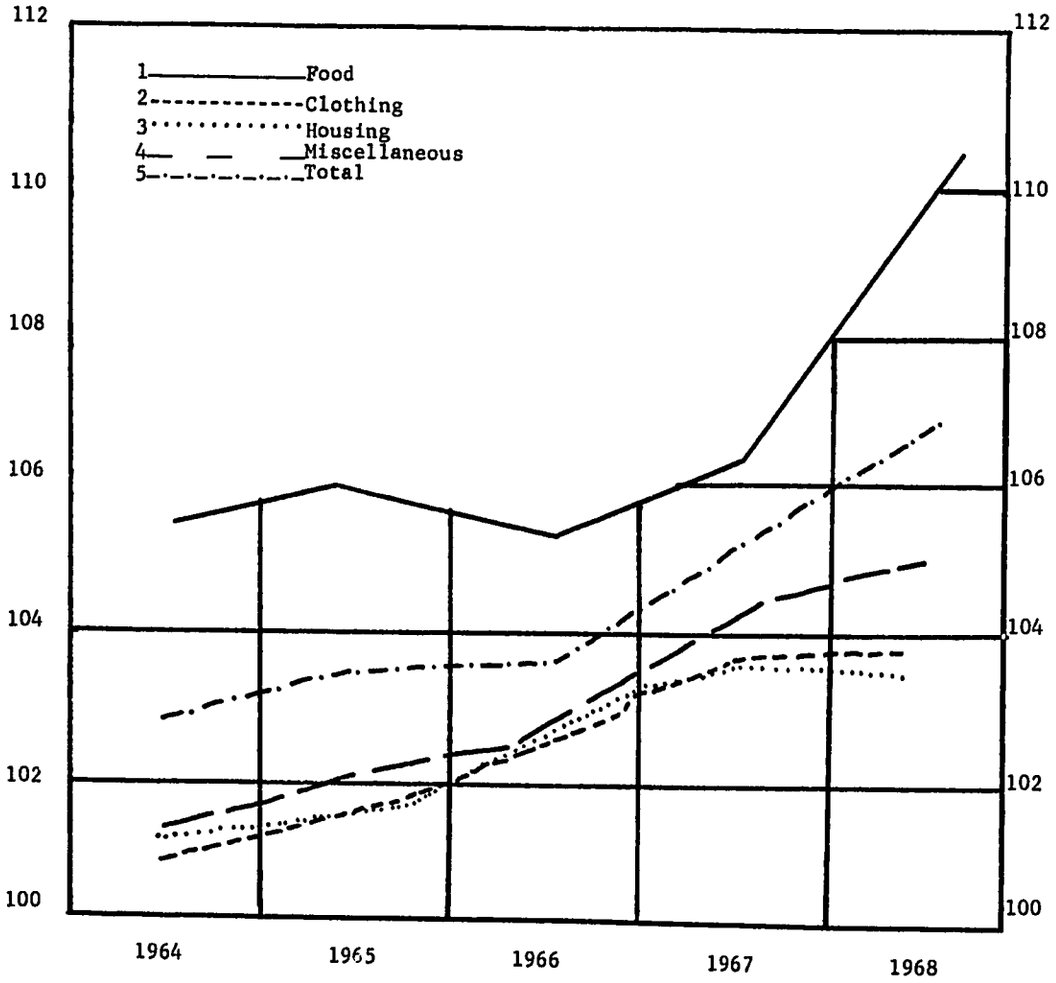


Illustration 11

CONSUMER PRICE INDEX FOR LOW AND MIDDLE INCOME FAMILIES
BY GROUPS OF ARTICLES AND SERVICES, PANAMA CITY: 1964 - 1968

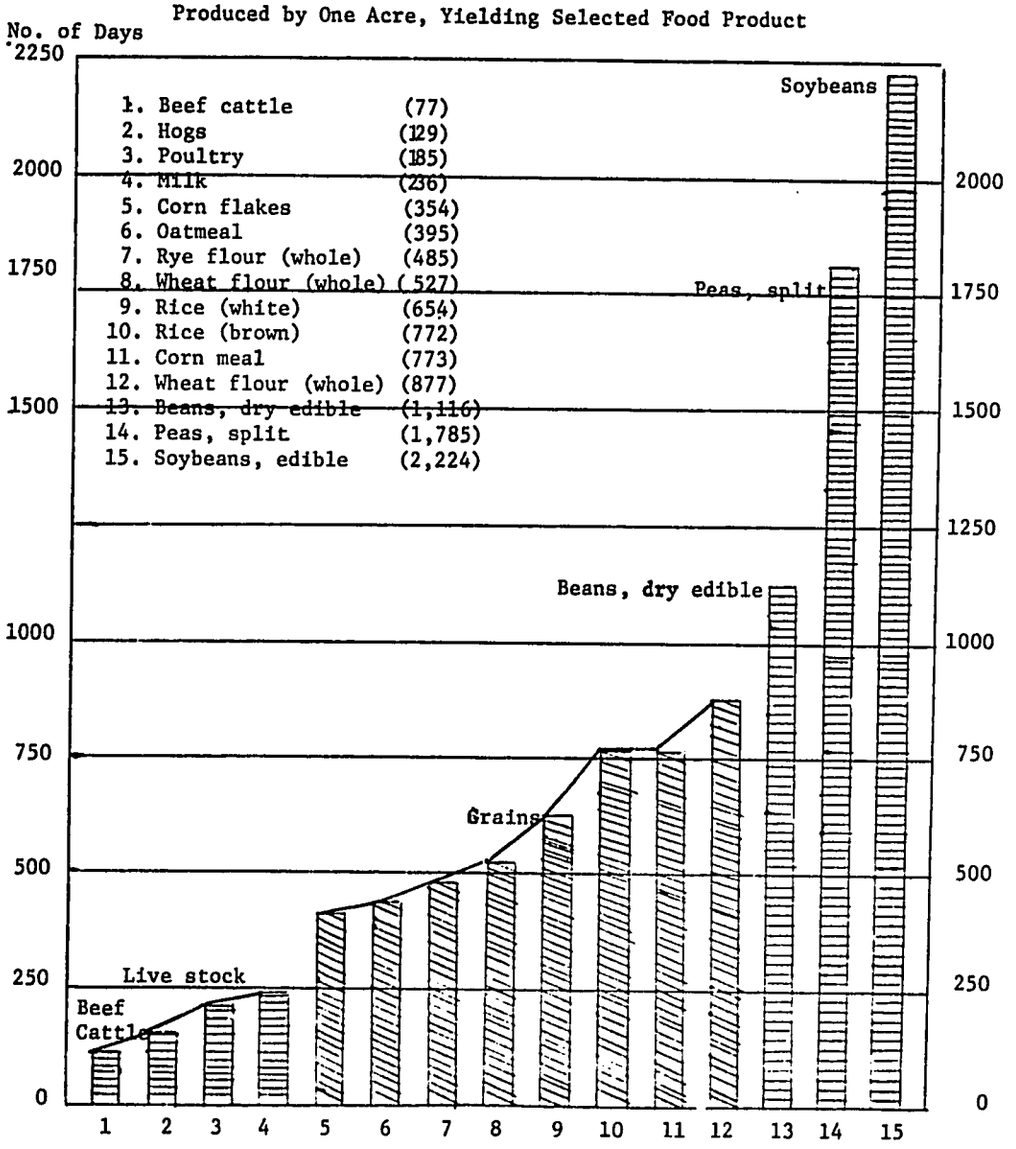


Source: Panama en Cifras, 1969

Illustration 12

NUMBER OD DAYS OF PROTEIN REQUIREMENT
(by a moderately active man)

Produced by One Acre, Yielding Selected Food Product



From Bean, L.H. WHO/FAE/UNIEF Protein Advisory
Group News Bulletin No. 6: 20-31 April 1966

Table 1

PANAMA: REPORTED CASES OF SELECTED COMMUNICABLE DISEASES BY AGE - 1966

Disease	Up to 1 year	1-4	5-14	15-49	50+	Age unknown	Total
Dysentery (all forms)	49	244	227	304	76	48	948
Hepatitis	5	21	68	53	10	11	168
Influenza	761	1168	1511	2202	545	943	7130
Malaria	63	569	1301	1208	160	367	3668
Measles	222	766	486	129	4	78	1685
Polio	-	1	2	1	-	-	4
Tetanus	59	14	27	150	25	37	312
Tuberculosis	15	59	79	591	238	53	1035
Whooping Cough	84	142	81	4	-	4	315

SOURCE: PAHO Scientific Publication No. 186

Table 2

PANAMA: DISTRIBUTION OF WATER SUPPLIES AND WASTE DISPOSAL SYSTEMS

1967

	Urban (608,300)	Rural (720,400)
Water supplies	% Population Covered	
Access to potable water supply	100%	33%
Pipled water to home	84%	8%
Piped water not connected	16%	17%
Communal well	-	75%
Waste disposal system		
Access to available waste disposal system	88%	36%
Home connection	73%	1%
Septic tank or latrine	27%	99%

Table 3

PANAMA: PRINCIPAL DIAGNOSTIC CATEGORIES FOR MEDICAL CONSULTATIONS AND HOSPITAL DISCHARGES; SELECTED REPORTING INSTITUTIONS: 1967

DIAGNOSIS	Consultations				Discharges			
	Rank	Total	Less than one year	1-4 Yrs.	Rank	Total	Less than one year	1-4 Yrs.
Total		633,750	72,003	126,472		33,709	8,060	1,714
Total of following		306,398	32,133	57,798		23,748	1,109	1,586
Dental	1	39,292	0	687	14	45	0	2
Helminthiasis	2	28,423	734	7,052	6	430	10	58
Bronchitis	3	21,995	5,414	9,609	4	847	95	200
Accidents	4	17,492	282	1,888	2	2,021	30	114
Acute Respiratory Disease	5	16,255	4,850	5,118	15	35	5	2
Tonsillitis	6	14,341	1,814	5,052	12	182	15	34
Anemias	7	13,308	520	2,015	9	371	2	15
Gastroenteritis	8	12,715	5,307	4,480	3	1,337	208	232
Gynecologic disorders	9	7,379	52	124	5	546	2	2

(3 cont'd)

DIAGNOSIS	Consultations				Discharges			
	Rank	Total	less than one year	1-4 Yrs.	Rank	Total	les than one year	1-4 Yrs.
Neural	10	6,542	860	1,043	7	421	25	26
Allergies	11	5,737	250	910	10	233	5	18
Urinary	12	5,347	49	194	8	405	7	16
Cutaneous	13	5,176	937	1,005	13	104	2	4
Locomotor	14	5,050	93	111	11	231	4	4
Normal Delivery	15	1,065			1	5,565		
The Remaining Disorders		106,281	10,971	18,510		10,975	699	859
Others		327,352	39,870	68,674		[illegible],961	6,951	128

*Preliminary Data

NOTE: Excludes information from Hospital del Nino, Hospital Nicolas A. Solano, Centro Emiliano Ponce, Centro de Salud de la Chorrera, Centro de Salud de Arranijan, C.M.I. El Real, Centro Medico Integrado de La Palma, Brigada Movil del Darien, Centro de Salud de Nargana, Centro de Salud de Calobre y Centro de Salud de Almirante.

Only partial data reported from: Hospital Manuel Amador Guerrero, Hospital Santo Tomas (solo egresos por enfermedades Transmisibles), Hospital Psiquiatrico Nacional, Centro de Salud de San Miguelito, Centros de Salud de Capira, Chame, La Pintada, El Valle y Hospital San Juan de Dios.

SOURCE: Panama En Cifras, 1969.

Table 4

PANAMA: INDUSTRIAL HAZARDS

Observed Worker Exposures and Protection Controls

Types of Exposure	# Exp.	# Exp. with Pro.	# Exp. without Protection	% Exp. with Pro.	# Exposures with control by type of control: General Ventilation Pos.	General Ventilation Neg.	Local Exhaust	Machinery Enclosed	Wet. Proc.	Respirators	Protec. Cloth.	Other
Total	29,363	5,735	23,628	19.9	846	461	339	9		416	3,578	
Mineral Acids	336	175	161	52.0	5	5	5			29	139	
Organic Acids	209	157	92	75.1	11	5	5			25	111	
Alcohol, ether ester	379	50	329	13.1	5	12	5			5	23	
Alkalines	698	142	556	20.3						6	136	
Analin & compounds												
Arsenic & compounds												
Benzene												
Cyanide	4	4		100.0						4		
Carbon Monoxide	56	6	50	10.7						2	4	
Chlorine	73		73									
Chromium & Compounds	41	18	23	43.9							18	
Organic & Inorganic chemical compounds	243	73	170	30.0							73	

PANAMA: INDUSTRIAL HAZARDS (continued)

Observed Worker Exposures and Protection Controls

Types of Exposure	# Exp.	# Exp. with Pro.	# Exp. without Protection	% Exp. with Pro.	# Exposures with control by type of control: Ventilation Pos.	Ventilation Neg.	Local Exhaust	Machinery Enclosed	Wet. Proc.	Respirators	Protec. Cloth.	Other
Burns & lacerations	492	106	386	21.5		1.4	22				70	
Lead Compounds	1,143	232	911	20.2			22			20	190	
Mercury & Compounds												
Oils	1,527	277	1,250	18.1	24	53	5			31	164	
Other gases	869	311	558	35.7	38	89				20	164	
Other metals & compounds	846	372	474	43.9	31					44	297	
Paints	603	92	511	15.2		8				6	78	
Petroleum products	1,895	254	1,641	13.4						28	226	
Inorganic Salts	25	18	7	72.0							18	
Sulphur & compounds	326	8	318	2.4							8	
Sulphur dioxide												
Poor lighting	111	14	97	12.6							14	
Abnormal temp.	1,614	237	1,377	14.6	17	51	5			29	135	
Noise	5,348	990	4,358	18.5	197	99	90			52	552	

PANAMA: INDUSTRIAL HAZARDS (continued)

Observed Worker Exposures and Protection Controls

Types of Exposure	# Exp.	# Exp. with Pro.	# Exp. without Protection	% Exp. with Pro.	# Exposures with control by type of control: General Ventilation Pos.	General Ventilation Neg.	Local Exhaust	Machinery Enclosed	Wet. Proc.	Respirators	Protec. Cloth.	Other
Dermatitis	2,375		1,921	19.1	202	5	27			5	215	
Asbestos dust	7		7									
Silicate dust	917	139	778	15.1		2	66				71	
Carbon dust	164	8	156	4.8							8	
Silica dust	625	50	575	8.0			1				49	
Organic dust	5,283	938	4,345	17.7	218	60	106			68	486	
Non-silica dust	479	89	390	18.5							89	
Dyes	1,053	279	774	26.4	63	51	5	5			155	
Halogenated hydrocarbons	188	66	122	35.1	12					20	34	
(leather)	552	76	476	13.7			65				11	
Excessive humidity	10		10									
Hydrogen sulfide	660	100	560	15.1	23	7				30	40	
Infections	212		212									

Source: A Look at the Industrial Hygiene Problems of the City of Panama, 1957.

Tables 5,6,7 and 8 contain statistics drawn from a recent report entitled "Population of Panama: Estimates and Projections 1961-2001" for USAID, by Carloyn D. Yandle and Jeffrey Stone of the International Demographic Statistics Center, U.S. Bureau of the Census. The report essentially builds a rationale for a population program by showing that such a program would have significant beneficial effects on the problems caused by population. The report uses a curve developed in a United Nations study, World Population Prospects as Assessed in 1963, which postulates that once the fertility level in a country begins to decline, it follows a general curve over a thirty year period. Using this curve, the report gives four different population projections depending on whether Panama can institute an effective population program which would make fertility levels decline and, if so, when this decline will begin. The four projections are as follows:

Series A. No decline in the fertility level

Series B. Decline beginning in 1981

Series C. Decline beginning in 1976

Series D. Decline beginning in 1971

Because Panama has no effective population control program and because such a program requires several years before its impact on the fertility levels is felt, Series D and even Series C are extremely unlikely but are examples of the dramatic changes caused by a population program. Possible methodological criticisms about the validity of the UN curve as applied to Panama do not seem to undermine the report's conclusions that a population program would make significant changes in the size and age composition of Panama's population over the next few decades.

Table 5

PANAMA: POPULATION PROJECTIONS AND AVERAGE ANNUAL RATE OF INCREASE

Total Pop. in millions	Series A (no decline)	Series B (Decline begins in 1981)	Series C (begins 1976)	Series D (begins 1971)
1961	1.036	1.036	1.036	1.036
1970	1.385	1.385	1.385	1.385
1980	1.947	1.947	1.940	1.909
1990	2.767	2.712	2.625	2.503
2001	4.114	3.677	3.436	3.171
Average Annual Rate of Increase (%)				
1961	3.2	3.2	3.2	3.2
1961-2001	3.5	3.2	3.2	3.2
2000-2001	3.7	2.5	2.1	1.9

Table 6

PANAMA: POPULATION BY AGE GROUPS AND PERCENT INCREASE (in Millions)

Series	A	B	C	D
Age Group				
0-6years				
1961	.24	.24	.24	.24
1970	.331	.331	.331	.331
1980	.472	.472	.464	.435
1990	.677	.625	.560	.492
2001	1.013	.715	.608	.513
%Increase				
1961-2001	3.7	2.7	2.4	1.9
2000-2001	3.7	0.8	0.0	0.3
7-12years				
1961	.162	.162	.162	.162
1970	.220	.220	.220	.220
1980	.319	.319	.319	.317
1990	.454	.452	.431	.389
2001	..681	.571	.502	.432
%Increase				
1961-2001	3.6	3.2	2.9	2.5
2000-2001	3.8	1.3	1.0	0.4

Table 6 (cont'd)

	A	B	C	D
13-18				
1961	.132	.132	.132	.132
1970	.176	.176	.176	.176
1980	.254	.254	.254	.254
1990	.366	.366	.365	.352
2001	.543	.515	.466	.412
% Increase				
1961-2001	3.6	3.5	3.2	2.9
2000-2001	3.8	1.3	1.0	0.4
15-64				
1961	.549	.549	.549	.549
1970	.725	.725	.725	.725
1980	1.000	1.000	1.000	1.000
1990	1.412	1.412	1.412	1.406
2001	2.097	2.083	2.038	1.958
% Increase				
1961-2001	3.4	3.4	3.3	3.2
2000-2001	3.7	3.5	3.1	2.7

65+ (All series are the same as this group is not affected by a fertility decline by 2001)

Population is .037 million in 1961, .046 in 1970, .065 in 1980, .094 in 1990, .128 in 2001.

Percent(%) increase, 3.2 from 1961-2001, 3.0 from 2000-2001.

Table 7

PANAMA: POPULATION DISTRIBUTION BY AGE GROUPS
(Percent of Total Population)

Series	A	B	C	D
0-14 Years				
1961	43.4	43.4	43.4	43.4
1970	44.3	44.3	44.3	44.3
1980	45.3	45.3	45.1	44.2
1990	45.6	44.5	42.7	40.1
2001	45.9	39.9	37.0	34.2
15-39				
1961	36.9	36.9	36.9	36.9
1970	36.5	36.5	36.5	36.5
1980	36.6	36.6	36.8	37.5
1990	36.9	37.6	38.9	40.5
2001	37.1	41.1	42.7	43.7
40-64				
1961	16.1	16.1	16.1	16.1
1970	15.8	15.8	15.8	15.8
1980	14.7	14.7	14.8	15.0
1990	14.1	14.4	14.9	15.6
2001	13.9	15.5	16.6	18.0
65 +				
1961	3.6	3.6	3.6	3.6
1970	3.3	3.3	3.3	3.3
1980	3.4	3.4	3.4	3.4
1990	3.4	3.4	3.6	3.7
2001	3.1	3.5	3.7	4.0

Table 8

PANAMA: DEPENDENCY RATIOS*

Series	A	B	C	D
1961	88.7	88.7	88.7	88.7
1970	90.9	90.9	90.9	90.9
1980	94.7	94.7	94.0	90.9
1990	96.0	92.1	86.0	78.1
2001	96.2	76.5	68.6	62.0

*Dependency ratios based upon number in age groups 0-14 years and 65+ years per 100 in age group 15-64.

Table 9

PANAMA: POPULATION BY AREA, PROVINCE AND CITIES OF PANAMA AND COLON: 1964-1970

	1964	1965	1966	1967	1968	1969	1970
TOTAL	1,205,100	1,245,900	1,286,700	1,328,700	1,372,200	1,417,100	1,463,500
City of Panama	316,500	329,800	343,700	358,200	373,200	389,000	405,300
City of Colon	62,100	62,800	63,500	64,200	64,900	65,600	66,300
Bocas del Toro	36,700	37,900	39,300	40,700	42,200	43,600	45,100
Cocle	102,800	105,800	108,700	111,700	114,800	118,000	121,200
Colon	111,300	113,200	115,000	116,800	118,600	120,500	122,400
Chiriqui	211,800	219,000	226,200	233,700	241,300	249,200	257,300
Darien	21,600	22,200	22,900	23,500	24,100	24,800	25,500
Herrera	67,200	69,000	70,600	72,300	74,100	75,100	77,700
Los Santos	75,100	76,500	77,800	79,100	80,500	81,500	83,200
Panama	435,400	455,500	475,900	497,100	519,200	542,200	566,300
Veraguas	143,200	146,800	150,300	153,800	157,400	161,100	164,800
Urban	528,000	554,100	580,600	608,300	637,200	667,300	698,700
Bocas del Toro	6,700	6,900	7,100	7,300	7,500	7,700	7,900
Cocle	21,500	22,800	24,000	25,300	26,600	27,000	29,400
Colon	63,400	64,500	65,600	66,600	67,700	68,800	69,800
Chiriqui	51,600	54,400	57,200	60,200	63,200	66,400	69,800
Herrera	13,500	13,900	14,200	14,600	15,000	15,300	15,700
Los Santos	7,300	7,500	7,700	7,900	8,100	8,400	8,600
Panama	350,200	369,700	389,800	410,800	432,800	455,800	479,900
Veraguas	13,800	14,400	15,000	15,600	16,300	16,900	17,600
Rural	677,100	691,800	706,100	720,400	735,000	749,800	764,800
Bocas del Toro	30,000	31,000	32,200	33,400	34,700	35,900	37,200
Cocle	81,300	83,000	84,700	86,400	88,200	90,000	91,800
Colon	47,900	48,700	49,400	50,200	50,900	51,700	52,600
Chiriqui	160,200	164,600	169,000	173,500	178,100	182,800	187,500
Darien	21,600	22,200	22,900	23,500	24,100	24,800	25,500
Herrera	53,700	55,100	56,400	57,700	59,100	60,600	62,000
Los Santos	67,800	69,000	70,100	71,200	72,400	73,400	74,600
Panama	85,200	85,800	86,100	86,300	86,400	86,400	86,400
Veraguas	129,400	132,400	135,300	138,200	141,100	144,200	147,200

Source: Panama en Cifras, 1969

SOURCE: Panama en Cifras, 1969

Table 10

PANAMA: THE 10 LEADING CAUSES OF DEATH MEDICALLY CERTIFIED ACCORDING TO RANK AND PERCENTAGE OF TOTAL: 1967 & 1968

CAUSE	1968 (Prov.)		1967	
	Per cent	Rank	Per cent	Rank
Total	100.0		100.0	
Ischemic Heart Disease	11.0	1	9.6	2
Malignant Tumors	9.7	2	10.2	1
Accidents, Poisonings and Suicides	8.7	3	8.5	3
Cerebrovascular Accidents	7.5	4	8.4	4
Pneumonia	6.3	5	7.5	5
Enteridides	6.0	6	6.1	6
Birth Injuries and Infant Anoxia	4.5	7	4.6	7
Tuberculosis	4.0	8	3.8	8
Other Causes of Death In Infants Under 1 Year	3.3	9	3.8	8
Other Forms of Heart Disease	2.3	10	1.4	14
Congenital Anomalies	2.3	10	2.5	10
The Remaining Causes	34.4	-	33.6	-

Table 11a

THE TEN LEADING CAUSES OF DEATH

All Ages

Causes of Death	Death 1964	Death 1965	Death 1966	Death rates per 100,000 1964	1965	1966	% of each cause to all causes 1964	1965	1966
ALL CAUSES.....	8 454	8 687	9 184	737.5	735.4	751.9	100.0	100.0	100.0
1. Heart diseases (B24-B28)	596	627	734	52.0	53.1	60.1	7.0	7.2	8.0
2. Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues (B18)	557	529	556	48.6	44.8	45.5	6.6	6.1	6.1
3. Gastritis, duodenitis, enteritis, colitis, except diarrhoea of the newborn (B36).....	537	449	507	46.8	38.0	41.5	6.4	5.2	5.5
4. Vascular lesions affecting central nervous system (B22)	529	520	513	46.1	44.0	42.0	6.3	6.0	5.6
5. All accidents (BE47, BE48)...	473	492	501	41.3	41.6	41.0	5.6	5.7	5.5
6. Influenza and pneumonia (B30, B31)	408	539	505	35.6	45.6	41.3	4.8	6.2	5.5
7. Tuberculosis (B1, B2)	285	247	261	24.9	20.9	21.4	3.4	2.8	2.8
8. Birth injuries, postnatal asphyxia and atelectasis (B42)	274	286	273	23.9	24.2	22.4	3.2	3.3	3.0
9. Bronchitis (B32).....	262	260	269	22.9	22.0	22.0	3.1	3.0	2.9
10. Anaemias (B21).....	161	186		12.0	15.7		1.9	2.1	
Measles (B14)			249			20.4			2.7
All other causes.....	4 372	4 552	4 816	381.4	385.5	384.3	51.7	52.4	52.4

SOURCE: WHO Statistical Report, 1970

Table 11b

THE TEN LEADING CAUSES OF DEATH

1 - 4 Years

Causes of Death	Deaths			Death rates per 100,000			% of each cause to all causes		
	1964	1965	1966	1964	1965	1966	1964	1965	1966
ALL CAUSES.....	1195	1172	1373	798.2	719.5	839.2	100.0	100.0	100.0
1. Gastritis, duodenitis, enteritis, colitis, except diarrhoea of the newborn (B36).....	191	184	163	127.6	113.0	99.6	16.0	15.7	11.9
2. Influenza and pneumonia .... (B30, B31)	118	126	141	78.8	77.3	86.2	9.9	10.8	10.3
3. Bronchitis (B32).....	116	103	125	77.5	63.2	76.4	9.7	8.8	9.1
4. Whooping Cough (B9)	48	57	36	32.1	35.0	22.0	4.0	4.9	2.6
5. All accidents (BE47,BE48)....	46	54	73	30.7	33.1	44.6	3.8	4.6	5.3
6. Measles (B14).....	40	54	134	26.7	33.1	81.9	3.3	4.6	9.8
7. Anaemias (B21)	29	28	28	19.4	17.2	17.1	2.4	2.4	2.0
8. Tuberculosis (B1, B2).....	15	24	25	10.0	14.7	15.3	1.3	2.0	1.8
9. Nephritis and nephrosis (B38)	11	10		7.3	6.1		0.9	0.9	
10. Diphtheria (B8).....	10			6.7			0.8		
Non-meningococcal meningitis (B23)		18	14		11.0	8.6		1.5	1.0
Malaria (B16)			11			6.7			0.8
All other causes	571	514	623	381.4	315.8	380.8	47.9	43.8	45.4

PANAMA: Table 11c

THE TEN LEADING CAUSES OF DEATH

5 - 14 Years

Causes of Death	Deaths			Death rates per 100,000			% of each cause to all causes		
	1964	1965	1966	1964	1965	1966	1964	1965	1966
All Causes.....	413	390	472	136.0	125.6	147.7	100.0	100.0	100.0
1. All accidents (BE47,BE48)	55	70	73	18.1	22.6	22.8	13.3	17.9	15.5
2. Anaemias (B21)	23	19	18	7.6	6.1	5.6	5.6	4.9	3.8
3. Influenza and pneumonia (B30,B31)	19	29	19	6.3	9.3	5.9	4.6	7.4	4.0
4. Tuberculosis	17	13	8	5.6	4.2	2.5	4.1	3.3	1.7
5. Whooping cough (B9)	16	7		5.3	2.3		3.9	1.8	
6. Measles (B14)	16	4	63	5.3	1.3	19.7	3.9	1.0	13.3
7. Gastritis, duodenitis, enteritis, colitis, except diarrheal of the newborn (B36)	12		19	4.0		5.9	2.9		4.0
8. Malignant neoplasms, including neoplasms of lymphatic and haemato-poietic tissues (B18)	11	13	13	3.6	4.2	4.1	2.7	3.3	2.8
9. Nephritis and nephrosis (B38)	11	8	9	3.6	2.6	2.8	2.7	2.1	1.9
10. Bronchitis (B32)	10		10	3.3		3.1	2.4		2.1
Non-meningococcal meningitis (B23)		6		1.9				1.5	
Malaria (B16)		4		1.3				1.0	
Congenital malformations (B41)					2.8				1.9
All other causes	223	217	231	73.4	69.8	72.5	53.9	55.8	49.0

Table 11d

THE TEN LEADING CAUSES OF DEATH

15 - 44 Years

Causes of Death	Deaths			Death rates per 100,000			% of each cause to all causes		
	1964	1965	1966	1964	1965	1966	1964	1965	1966
All Causes.....	1209	1182	1229	251.9	243.8	241.7	100.0	100.0	100.0
1. All accidents (BE47,BE48)	214	207	203	44.6	42.7	39.9	17.7	17.5	16.5
2. Tuberculosis (B1,B2)	123	78	90	25,6	16.1	17.1	10.2	6.6	7.3
3. Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues (B18)	77	73	81	16.0	15.1	15.9	6.4	6.2	6.6
4. Deliveries and complications of pregnancy, childbirth, and the puerperium (B40)	71	69	72	14.8	14.2	14.2	5.9	5.8	5.9
5. Homicide and operations of war (BE50)	61	43	45	12.7	8.9	8.8	5.0	3.6	3.7
6. Heart disease (B24-B28)	54	59	56	11.3	12.2	11.0	4.5	5.0	4.6
7. Suicide and self-inflicted injury (BE49)	48	55	56	10.0	11.3	11.0	4.0	4.7	4.6
8. Influenza and pneumonia (B30, B31)	45	28	53	9.4	5.8	10.4	3.7	2.4	4.3
9. Anaemias (B21)	31	40	29	6.5	8.3	5.7	2.6	3.4	2.4
10. Vascular lesions affecting central nervous system (B22)	29	30	35	6.0	6.2	6.9	2.4	2.5	2.8
All other causes.....	456	500	509	95.0	103.0	100.2	37.6	42.3	41.3

Table 11e

THE TEN LEADING CAUSES OF DEATH

45 - 64 Years

Causes of Death	Deaths			Death rates per 100,000			% of each cause to all causes		
	1964	1965	1966	1964	1965	1966	1964	1965	1966
ALL CAUSES.....	1255	1333	1360	967.6	988.1	973.3	100.0	100.0	100.0
1. Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues (B18)	210	200	210	161.9	148.3	144.8	16.7	15.0	14.9
2. Heart disease (B24-B28)	148	160	218	114.1	118.6	157.1	11.8	12.0	16.1
3. Vascular lesions affecting central nervous system (B22)	124	123	121	95.6	91.2	87.2	9.9	9.2	9.0
4. All accidents (BE47, BE48)	84	81	73	64.8	60.0	52.6	6.7	6.1	5.4
5. Tuberculosis (B1, B2)	68	73	74	52.4	54.1	53.3	5.4	5.5	5.5
6. Influenza and pneumonia (B30, B31)	48	68	37	37.0	50.4	26.7	3.8	5.1	2.7
7. Hypertension without mention of heart (B29)	31	25	28	23.9	18.5	20.2	2.5	1.9	2.1
8. Diabetes mellitus (B20)	29	32	24	22.4	23.7	17.3	2.3	2.4	1.8
9. Anaemias (B21)	29	40	33	22.4	29.7	23.8	2.3	3.0	2.4
10. Nephritis and nephrosis (B38)	16	26		12.3	19.3		1.3	2.0	
Ulcer of stomach and duodenum (B33)			23			16.6			1.7
All other causes	468	505	519	360.8	374.3	373.7	37.3	37.8	38.4

Table 11f

THE TEN LEADING CAUSES OF DEATH

65 Years and over

Causes of Death	Deaths			Death rates per 100,000			% of each cause to all causes		
	1964	1965	1966	1964	1965	1966	1964	1965	1966
ALL CAUSES.....	2327	2416	2457	5593.7	5579.7	5648.3	100.0	100.0	100.0
1. Heart disease (B24-B28)	382	394	440	918.3	909.9	1011.5	16.4	16.3	17.9
2. Vascular lesions affecting central nervous system (B22)	358	351	339	800.6	810.6	779.3	15.4	14.5	13.8
3. Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues (B18)	247	231	254	593.7	533.5	583.9	10.6	9.6	10.3
4. Influenza and pneumomia (B30, B31)	94	122	121	226.0	281.8	278.2	4.0	5.0	4.9
5. Tuberculosis (B1, B2)	54	52	51	129.8	120.1	117.2	2.3	2.2	2.1
6. All accidents (BE47, BE48)	53	56	58	127.4	129.3	133.3	2.3	2.3	2.4
7. Diabetes mellitus (B20)	51	49	56	122.6	113.2	128.7	2.2	2.0	2.3
8. Hypertension without mention of heart (B29)	47	48	47	113.0	110.9	108.0	2.0	2.0	1.9
9. Anaemias (B21)	45	48	42	108.2	110.9	96.6	1.9	2.0	1.7
10. Nephritis and nephrosis (B38)	28	25		67.3	57.7		1.2	1.0	
Intestinal obstruction and hernia (B35)			20			46.0			0.8
All other causes	968	1040	1029	2326.9	2401.8	2365.6	41.7	43.1	41.9

Table 12a

PANAMA: COMMUNICABLE DISEASE DEATHS BY RANK, CAUSE AND MEDICAL CERTIFICATION: 1968

RANK	CAUSE	TOTAL 1968	MEDICAL CERTIFICATION	% MEDICALLY CERTIFIED
1	Enteritis & Dysenteries	582	336	58
2	Pneumonia	549	334	61
3	Tuberculosis All Forms	285	216	76
4	Tetanus	217	100	46
5	Pertussis	273	40	15
	Measles	215	63	29
6	Helminthiasis	120	33	27
7	Influenza	25	13	52
8	Malaria	19	3	16

SOURCE: Panama en Cifras, 1969

Table 12b

PANAMA: DEATHS FROM COMMUNICABLE DISEASES

Cause	1965*	1966+	1966 Rate+
Tuberculosis - All Forms	247	261	19.0
Tetanus	216	---	
Whooping Cough	99	49	4.0
Measles	82	249	20.2
Influenza	40	47	3.8
Malaria	25	29	2.4
Syphilis	17	27	2.2
Dysentery - Unspecified	13	---	
Food Poisoning	7	---	
Diphtheria	6	9	0.7
Hepatitis	6	---	
Meningococcal Infection	6	3	0.2

Source:
* PAHO Sci. Publ. No. 149
+ U.N. Demographic Yearbook 1967

Table 13

PANAMA: REPORTED CASES OF SELECTED COMMUNICABLE DISEASES BY AGE-1965

Disease	0-5 mos.	6-11 mos.	1-4	5-14	15-24	25-49	50+	Total
Dysentery (all forms)	8	51	250	265	127	270	166	1137
Gonococcal Infection	3	4	4	11	195	150	34	401
Hepatitis Infections	5	--	91	208	53	30	14	401
Influenza	93	553	1320	1147	677	1110	824	5724
Malaria	3	57	363	740	369	351	180	2063
Measles	9	120	462	245	50	39	16	942*
Polio - Acute	--	1	4	2	2	--	--	9
Syphilis	--	5	1	2	120	183	40	351
Tetanus	88	11	7	7	6	5	8	132
Tuberculosis	10	79	184	166	134	405	376	1354
Whooping Cough	38	254	713	363	12	14	19	1413

* Includes one age unknown

Source: PAHO Scientific Publication No. 149

Table 14a

PANAMA: REPORTED CASES AND DEATHS

FROM TETANUS WITH RATES PER 100,000 POPULATION - 1965

Cases *	
Number	132
Rate	10.6
Deaths *	
Number	216
Rate	17.3
Reported Cases Per Death	0.6

SOURCE: PAHO Scientific Publication No. 149

* See Tables 12b and 13.

Table 14b

PANAMA: DEATH RATES FROM TETANUS

PER 100,000 POPULATION BY AGE - 1965

Age Group	Rate
All Ages	17.3
Under 1 year[a/]	108.7
1-4 years	4.2
5-14 years	1.2
15-24 years	1.3
25-44 years	1.4
45-64 years	2.8
65+	4.5

a/ Per 100,000 live births

Source: PAHO Scientific Publication No. 149

Table 15

PANAMA: REPORTED CASES OF TUBERCULOSIS: 1964 - 1968

YEAR	Total Cases	Pulmonary Primary Infection	Pulmonary Reinfection					
			Total Re-infection	Minimal	Moderately Advanced	Greatly Advanced	Extension not Specified	Extra Pulmonary
1968	10,717	1,735	8,722	2,888	3,763	1,957	114	260
1967	10,582	1,918	8,432	2,709	3,664	1,943	116	232
1966	10,067	1,940	7,896	2,440	3,450	1,891	115	231
1965	11,600	2,261	9,106	2,582	3,866	2,032	626	233
1964	12,136	2,314	9,595	2,430	4,037	2,245	883	227

SOURCE: Panama en Cifras, 1969

Table 16a

INCIDENCE RATES OF REGISTERED CASES OF TUBERCULOSIS

BY PROVINCE: 1963-1968

Province	Year					
	1968	1967	1966	1965	1964	1963
TOTAL.....	1.2	1.3	1.2	1.3	1.7	2.0
Bocas del Toro (2).....	0.8	0.4	0.1	0.3	0.2	0.2
Cocle.....	2.0	1.1	1.4	1.2	1.0	1.5
Colon.....	1.2	1.2	1.3	1.9	3.1	5.3
Chiriqui.....	0.9	0.9	0.7	0.6	1.4	0.9
Darien (3).....	1.6	6.2	1.4	1.3	1.4	0.9
Herrera.....	0.5	0.5	0.4	0.3	0.3	0.6
Los Santos.....	0.2	0.4	0.3	0.2	0.3	2.2
Panama.....	1.0	1.2	1.3	1.7	2.1	2.3
Veraguas.....	2.2	2.4	2.2	1.7	2.1	1.7

(1) Rate per 1,000 population based upon midyear population estimates.

(2) Tuberculosis surveys were not made in this province, therefore the rate is not representative.

(3) First survey made in 1967, cases presented represent mixed prevalence and incidence rates.

Source: Ministry of Health
National Antituberculosis Campaign
Division of Statistics and Epidemiology

Table 16b

PREVALENCE RATES OF TUBERCULOSIS BY PROVINCE: 1963-1968

Province	Year					
	1968	1967	1966	1965	1964	1963
TOTAL.....	8.2	7.9	7.8	9.3	10.0	13.8
Bocas del Toro (2).....	1.3	0.6	0.5	0.6	0.5	1.7
Cocle.....	7.3	6.0	5.4	7.1	6.8	8.4
Colon.....	19.4	16.7	16.2	19.9	20.4	23.5
Chiriqui.....	6.1	5.3	5.0	7.1	7.3	8.5
Darien.....	16.6	12.3	6.9	7.3	6.6	6.6
Herrera.....	3.6	3.5	3.8	4.5	5.0	6.7
Lcs Santos.....	2.4	2.6	2.6	2.9	3.3	4.2
Panama.....	7.8	8.6	9.0	10.7	12.4	20.0
Veraguas.....	11.4	10.6	10.2	9.8	10.1	11.1

(1) Rates per 1,000 population. Midyear population estimates. Includes indigenous population.

(2) Tuberculosis surveys were not made in this province, therefore, the rate is not representative.

Source: Ministry of Health
National Antituberculosis Campaign
Division of Statistics and Epidemiology

Table 16c

MORTALITY RATES FOR TUBERCULOSIS BY PROVINCE: 1962-1968

Province	1968 (2)	1967 (2)	1966	1965	1964	1963	1962	1961
TOTAL	20.8	20.2	21.3	20.9	25.0	22.3	23.6	22.6
Bocas del Toro.....	33.2	34.4	23.4	28.6	8.5	44.6	51.4	24.4
Cocle.....	11.3	14.3	11.0	18.0	26.3	10.0	10.3	7.4
Colon.....	35.4	27.4	47.7	28.6	42.2	34.2	42.8	33.3
Chiriqui.....	24.0	29.1	29.4	31.5	28.9	20.7	21.4	21.0
Darien.....	8.3	8.5	18.0	12.4	25.6	39.7	20.4	14.1
Herrera.....	9.4	12.4	12.7	3.0	8.9	16.7	18.8	11.2
Los Santos.....	3.7	5.0	2.6	1.3	8.0	8.1	2.8	7.0
Panama.....	16.6	14.7	17.3	17.8	20.9	21.2	26.1	25.3
Veraguas.....	38.1	33.2	28.0	32.1	39.4	33.7	25.5	33.8

(1) Rates Per 100,000 Population For The Year 1962-1966 Excludes The "Indigenous Population 1967 and 1968 Data Include The "Indigenous Population"

(2) Includes Deaths Among The Indigenous Population

SOURCE: Ministry of Health
National Antituberculosis Campaign
Division of Statistics and Epidemiology

Table 16d

INCIDENCE RATES OF TUBERCULOSIS BY PROVINCE AND AGE, 1968

Province	Total	Less than 1 year	1-4	5-14	15-44	45-64	65 and over
TOTAL.....	115.9	27.5	81.7	65.0	112.7	222.2	259.7
Bocas del Toro (2).....	75.0	92.6	75.9	28.6	52.3	96.5	-
Cocle.....	196.0	-	135.4	197.5	142.1	358.1	371.4
Colon.....	123.6	30.2	98.7	31.9	138.6	228.2	2.13.1
Chiriqui.....	94.5	47.5	50.9	33.9	132.3	142.8	232.6
Darien.....	158.2	-	148.1	19.6	161.5	362.7	-
Herrera.....	52.6	-	10.2	19.9	52.2	118.1	78.4
Los Santos.....	21.1	-	-	-	12.5	74.3	32.5
Panama.....	98.1	22.8	93.2	37.8	92.9	197.5	270.7
Veraguas.....	224.3	52.6	104.1	168.4	206.3	486.7	661.2

(1) Rate per 100,000 population.

(2) Province not studied.

Source: Ministry of Health
National Antituberculosis Campaign
Division of Statistics and Epidemiology

Table 16e

PREVALENCE RATES OF TUBERCULOSIS BY PROVINCE AND AGE, 1968

Province	Total	Less than 1 year	1-4	5-14	15-44	45-64	65 and over
TOTAL.....	820.8	11.8	167.5	433.2	921.2	1878.6	2116.2
Bocas del Toro (2).....	128.6	-	25.3	14.3	182.9	160.8	143.9
Cocle.....	730.8	-	235.4	466.8	692.5	1841.4	2599.5
Colon.....	1941.2	-	246.7	1643.4	2036.8	2741.4	2504.4
Chiriqui.....	610.3	23.8	31.8	164.5	913.5	1317.4	1671.5
Darien.....	1655.4	-	481.5	1060.9	2055.8	2849.7	5652.2
Herrera.....	356.3	-	40.9	89.5	404.8	861.9	1568.6
Los Santos.....	238.5	-	-	34.7	216.0	647.6	1526.0
Panama.....	784.7	13.7	238.3	400.9	803.3	1880.9	2012.3
Veraguas.....	1136.9	17.5	176.6	546.1	1247.0	3293.3	3608.8

(1) Rate per 100,000 population.

(2) Province not studied.

Source: Ministry of Health
National Antituberculosis Campaign
Division of Statistics and Epidemiology

Table 17

PANAMA: REPORTED CASES OF MALARIA AND POSITIVE BLOOD SMEARS

1960 - 1964	Median Cases		3416
1964	Cases Reported		1766
	Positive Slides		1804
1965	Cases Reported		2063
	Positive Slides		1929
1966	Cases Reported		3668
7/1968-6/1969	Cases Verified		3344
	of which:	Falciparum	1879
		Vivax	1446
		Mixed	17
		Not Stated	2

SOURCE: PAHO Publication No. 149 and 186
Memoria del Ministerio de Salud, 1969

Table 18

PANAMA: NUMBER OF SLIDES EXAMINED, CASES IDENTIFIED AND PERCENT POSITIVE YIELD FOR MALARIA BY MONTH - JULY 1968 - JANUARY 1970

Month	Number of Slides Examined	Number of Cases	Percent Positive Yield
July 1968	10,167	184	1.8
August	10,803	172	1.6
September	7,824	131	1.7
October	6,674	126	1.9
November	6,466	193	2.9
December	4,474	106	2.3
TOTAL	46,408	912	2.3
January 1969	4,107	117	2.8
February	6,018	151	2.5
March	6,495	199	3.0
April	5,674	444	7.8
May	7,516	635	8.4
June	7,255	720	9.9
July	8,686	639	7.4
August	8,570	578	6.7
September	10,002	566	5.6
October	14,121	1190	8.5
November	6,118	297	4.9
December	10,023	409	4.0
TOTAL	94,585	5945	6.0
January 1970	10,247	426	4.2

SOURCE: Memoria del Ministerio de Salud, 1969

Table 19

PANAMA: REPORTED CASES OF MALARIA BY PROVINCE WITH POPULATION ESTIMATES AND RATES/100,000 POPULATION, 1965 AND 1966.

Province	1965 Reported Cases	1965 Population Estimate	1965 Case Rate/ 100,000 Population	1966 Reported Cases	1966 Population Estimate	1966 Case Rate/ 100,000 Populatior
Bocas Del Toro	45	37,900	118.5	22	39,300	56
Chiriqui	834	219,000	381	1342	226,200	594
Cocle	46	105,800	43.5	79	108,700	72.6
Colon	466	113,200	412	527	115,000	458
Darien	170	22,200	765	575	22,900	2510
Herrera	11	69,000	16	39	70,600	55
Los Santos	82	76,500	107	288	77,800	370
Panama	263	455,500	57.6	621	475,900	131
Veraguas	146	146,800	100	160	150,300	106
TOTAL	2063	1,245,900	166	3668*	1,286,700	285

* Includes 15 cases, Province not stated

Sources - PAHO Scientific Publications No. 149 and 186

Panama en Cifras 1969

Table 20

ESTIMATED METABOLIC REQUIREMENTS
OF SELECTED DISEASES

DISEASE	INCREASE IN METABOLIC REQUIREMENTS		PERCENT INCREMENT IN BASIC ANNUAL CALORIC REQUIREMENTS PER CASE
	Acute Phase (duration)	Pro-or-Post Dromal Phase (duration)	
Tuberculosis Respiratory	* 22% (3 months)	7% (9 months) 10 kg. Wt. loss	11.0) 19.0% 8.8)
Malaria	* 18% (2.5 months)*	5 kg. Wt. Loss	3.8) 8.2% 4.4)
Dysentery	* 4% (20 days)	4 kg. Wt. Loss **	2.2) 5.7% 3.5)

* Including 30, 4 hour paroxysmal episodes at 60% increase in requirements.

* * Extrapolations base on 2400 calorie minimum daily requirements and each kg of body weight equivalent to 7700 calories.

SOURCE: Institute for Defense Analyses

Table 21

PANAMA: ESTIMATED ANNUAL CALORIC INCREMENTS REQUIRED BY SELECTED DISEASES

Disease	Annual Incremental Requirement per Patient	Calories of Labor to Produce Patients Increment (1)
Tuberculosis Respiratory	173,400 (2)	10.900 (3)
Malaria	71,800	4,500
Dysentery	49,000	3,000

(1) Based upon a input/output conversion ratio of 1/16 calories

(2) Derived by (19.8% X 2400 cal X 365 days = 173,400) rounded

(3) Derived by (173,400 ÷ 16 = 10,900) rounded

SOURCE: Institute for Defense Analyses

Table 22

PANAMA: SOCIAL SECURITY FUNDING AND ENTITLEMENTS

	Coverage	Source of Funds
Old Age Invalidity Death	Employees in private and public employment. Exclusions: Agricultural working less than 6 months a year; domestic workers occasional and seasonal employees; and family labor self-employed workers and others not covered by the compulsory system may join voluntary system.	Insured person: 5% of earnings. Employer: 7% of payroll Government: 0.8% of total covered earnings, plus proceeds of special taxes equaling about 0.3% of earnings; also employer contributions for public employees (paid mainly in form of bonds in past). Above contributions also finance sickness and maternity benefits
Sickness and Maternity	Employees in private and public employment; and pensioners (medical benefits only).	Insured person: see pension contribution above (pensioners 5% of pension) Employer: Same Government: same
Work Injury	Employees of firms in industry and commerce with 5 or more workers, and in agriculture if power machinery used or if undertaking employs 10 or more workers. Exclusions: Home workers, casual workers, and domestic workers.	Insured person: None Employer; Whole cost, through premimums fixed by insurance companies with approval of Social Insurance Fund. Government: None

Table 22 cont'd

	Qualifying Conditions	Cash Benefits for Insured Workers (except permanent disability)
Old Age	Old-Age pension: age 60 (men) or 55 (women); reduced pension up to 5 earlier if retirement due to health, 180 months of contribution (lump sum,if fewer) Retirement unnecessary under court ruling.	Old age pension: 50% average earnings during last 10 or 15 years; whichever is most favorable. Increment of 1% of earnings for each 12 months of contribution beyond 120 months (5% a year after retirement age).
Invalidity	Invalidity pension: Loss 2/3 of earning capacity. 36 months of contribution including 18 months during last 3 years.	Dependents; supplements: 10 balboas a month for wife, 5 balboas per child under 14, maximum 50 balboas Minimum and maximum pensions: 50 balboas a month and 500 balboas, or 80% of earnings if less.
Death	Survivor pension: Deceased met contribution requirements for old-age or invalidity pension, or was pensioner at death,	
Sickness and Maternity	Cash sickness benefits: 6 months of contribution during last 9 months.	Sickness benefits: 60% of earnings. Payable after 3-day waiting period for up to 26 weeks for one illness (52 weeks in special cases).
	Cash maternity benefits: 9 months of contribution during last 12 months.	Maternity benefit: 100% of an insured person average weekly earnings for previous 9 months, payable for up to 6 weeks before and 8 weeks after confinement.
	Medical benefits: 2 months of contribution during last 4 months (maternity care, 4 months during last 8 mos.).	
Work Injury	Work-injury benefits: no minimum qualifying period.	Temporary disability benefit: (work injury) 100% of earnings during first 2 months, 50% during next 10 months. Minumum and maximum benefits: 1 and 16 balboas a day.

(22 cont'd)

	Permanent Disability and Medical Benefits for Insured Workers
Old Age Invalidity Death	Invalidity pension: 50% of average earnings throughout coverage or during last 10 years. Increment of 1% of earnings for 12 months of contribution beyond 120 months. Constant-attendance supplement: 10% of earnings. Dependents' supplements: 10 balboas a month for wife, 5 balboas per child under 14. Maximum 50 balboas. Minimum and maximum pension: 50 balboas.
Sickness and Maternity	Medical benefits: Medical services ordinarily provided directly to patients through facilities of Fund (in special cases of where Fund has no facilities, reimbursement of part or all of cost of specialized care, surgery, hospitalization, laboratory services, medicines, dental care, and maternity care. Treatment by private physician is limited to 3 visits every 6 months.
Work Injury	Permanent disability pensions (work injury): 60% of earnings for first 3 years, 40% for next two, and 30% for 2 more years, if totally disabled. May be commuted to lump sum with approval of labor court. Partial disability: Pension for 3 years, varying with earnings and degree of disability according to schedule in law, may be commuted to lump sum. Medical benefits (work injury) general and specialist care, surgery, medicines, hospitalization and appliances.

(22 cont'd)

	Survivor Benefits and Medical Benefits for Dependents
Old Age	Widow's pension: 50% of pension of insured, paid to widow age 55, invalid, or caring for child; also payable to dependent invalid widower; paid to other widows for 3 years only. Orphans; pension 20% of pension of insured for each orphan under 15 (18 if student, no limit if invalid), or 50% if full orphan. Other eligible survivors (in absence of above): Parents, brothers, sisters, 30% of pension of insured for dependent mother or invalid father over 60; or in absence of these, 20% to brothers and sisters under 14. Funeral grant: Uniform lump sum. 100 balboas, provided insured has 6 months of contributions during 12 months preceding death
Sickness and Maternity	Medical benefits for dependents: Treatment in doctor's office, dental care, medicines, and some laboratory services. Provided to wife and children under age 10.
Work Injury	Widow's pension (work injury): 20% of earnings of insured (30% if no dependent children); payable for 6 years. Also payable to invalid widower. Orphans pensions (work injury): 15% of earnings for 1 orphan, 25% for 2, 35% for 4, and 40% for 4 or more orphans under 18, if full orphans 20% of earnings for 1 child, 15% for each additional child under 18. Funeral grant: Cost of burial; maximum 100 balboas.

(22 cont'd)

Old Age Invalidity Death	Ministry of Labor and Social Welfare, general supervision. Social Insurance Fund, administration of program; managed by tripartite board and director-general.
Sickness and Maternity	Ministry of Labor and Social Welfare, general supervision. Social Insurance Fund, administration of program. Fund operates own dispensaries and other medical facilities in larger cities.
Work Injury	Ministry of Labor and Social Welfare, enforcement of law. Labor inspectors and labor courts aid in compliance and appeals. Employers must insure liability with private insurance companies.

Table 23a

PANAMA: ESTIMATES OF LOSS OF MAN-YEARS FROM TUBERCULOSIS 1968 *

	Work Week	Minimal Week: 5/7 Varying Disability			Moderate Week: 6/7		
	Disability	90d.	180d.	365d.	90d.	180d.	365d.
Minimal Estimate Employed Only Females Discounted	1 ax: 3578 cases	627	1252	2540	751	1503	3077
	1 bx: 5495	934	1923	3901	1154	2307	4725
Moderate Estimate All Working Age Population Females Equivalent	1 ay: 5680 cases	966	1988	4033	1193	2256	4885
	1 by: 8722	1483	3053	6193	1832	3663	7501

* Based upon 365 day man-year

Table 23b

PANAMA: ESTIMATES OF 1968 DOLLAR WAGE LOSSES ACCORDING TO VARYING ASSUMPTIONS OF CASES, DISABILITY AND LENGTH OF WORK WEEK: TUBERCULOSIS

	Work Week	Minimal work week:5/7 days varying disability			Moderate work week:6/7 days		
	Disability	90days	180d.	365days	90days	180days	365days
Cases Minimal Estimate Employed only: Females	1ax:3578 cases	443,840	913,960	1,854,200	548,230	1,097,190	2,246,210
Discounted	1bx:5680	681,820	1,403,790	2,847,730	842,420	1,684,160	3,449,250
Cases: Moderate Estimate All Working Age	1ay:5680	705,180	1,451,240	2,944,090	870,890	1,741,780	3,566,050
Population: Females Equivalent	1by:8722	1,082,590	2,228,690	4,520,890	1,337,360	2,376,990	5,475,730

NOTE: Dollar Values Based Upon 365 Work Days Per Year, Minimum Wage of $2.00 Per Day

Table 24

PANAMA: MALE DEATHS FROM RESPIRATORY TUBERCULOSIS BY AGE GROUPS WITH ESTIMATES OF LOST YEARS OF PRODUCTIVE LIFE (1) AND POTENTIAL EARNINGS BY INDIVIDUAL AND AGE GROUP, 1966

Age groups	Deaths by age group	Assumed average age at Death	Productive Years of life lost/individual	Total Productive years of life lost/ age group	Total dollars lost in potential earnings per individual (2)	Total dollars lost in potential age group (2)
-1	7					
1-4	66					
5-9	3					
10-14	1					
15-19	5	17	43	215	$ 26,832	$ 134,160
20-24	3	22	38	114	23,712	71,136
25-29	7	27	33	231	23,592	144,144
30-34	11	32	28	308	17,472	192,192
35-39	6	37	23	138	14,352	87,912
40-44	9	42	18	162	11,232	101,088
45-49	12	47	13	156	8,112	97,344
50-54	10	52	8	80	4,992	49,920
55-59	12	57	3	36	1,872	22,464
60-64	12					
65+& unknown	31					
Total	195			1440		$ 900,360

(1) Based upon estimated male life expectancy of 60 years (1960 est. 59.8 years)
(2) Based upon minimal salary $2/day for 312 days/year

Table 25

PROJECTED COSTS OF TUBERCULOSIS TO THE SOCIAL SECURITY FUND AND THE INDIVIDUAL WORKER: VARYING NUMBERS, CASES AND LENGTHS OF DISABILITY

	Period of Disability					
	12 Weeks		25 Weeks		52 Weeks	
Cases**	Social Security	Individual	Social Security	Individual	Social Security	Individual
3,578	$360,696	$231,876	$751,450	$483,075	$1,563,016	1,004,796
5,495	553,896	356,076	1,153,950	741,825	2,400,216	1,542,996
5,680	572,544	368,064	1,192,800	766,800	2,481,024	1,594,944
8,722	879,144	565,164	1,831,550	1,177,425	3,809,624	2,449,044

* Costs based on Average weekly wage of $23.00 for 1968

** See Table 18a for explanation of case numbers

Table 26a

PANAMA: PER CAPITA DAILY PERCENT AVAILABILITY OF NUTRIMENTS BY SANITARY REGIONS, RURAL AREAS

Nutriments	Sanitary Regions			Total
	I	II	III	
Calories	111	104	100	104
Proteins	119	115	104	112
Calcium	70	60	51	59
Iron	147	144	134	141
Vitamin	42	44	58	49
Thiamin	123	123	103	116
Riboflavin	65	58	52	58
Niacin	107	112	102	108
Vitamin C	194	190	199	194

SOURCE: INFORME SOBRE EL ESTADO ACTUAL DE NUTRICION EL LA REPUBLICA DE PANAMA February 1970

Table 26b

PANAMA CITY: PER CAPITA DAILY INTAKE OF CALORIES AND NUTRIMENTS

Items	Units	Intake	Percent Availability
Calories.....		2101	98
Total protein.....	g	70.9	120
Fats.....	g	58.7	-
Carbohydrates.....	g	328	-
Calcium.....	mg	419	80
Phosphorus.....	mg	1034	-
Iron.....	mg	14.9	143
Vitamin A	mg	1.110	97
Thiamin.....	mg	0.91	107
Niacin.....	mg	14.8	105
Vitamin C.....	mg	107	230
Riboflavin.....	mg	0.98	76

Number of Families: 96

Number of Persons 539

SOURCE: Direccion de Estadistica y Censo, Contraloria General de la Republica. Ingreso Nacional, anos 1960-1964. Estadistica Panamena, ano XXV, Serie "C". Octubre de 1966.

Table 27

PANAMA

ESTIMATED CASES OF PROTEIN - CALORIC MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE, 1965

COUNTRY	Total population of children under 5	Malnutrition Grades 1,2,3 Total cases in the country	%	Malnutrition Grade 1 Total cases in the country	%	Malnutrition Grade 2 Total cases in the country	%	Malnutrition Grade 3 Total cases in the country	%
Costa Rica ...	294,300	168,928	57.4	128,609	43.7	35,904	12.2	4,415	1.5
El Salvador...	554,400	413,028	74.5	268,884	48.5	126,958	22.9	17,186	3.1
Guatemala ...	833,400	678,387	81.4	408,366	49.0	220,851	26.5	49,170	5.9
Honduras ...	346,900	251,503	72.5	149,167	43.0	94,357	27.2	7,979	2.3
Nicaragua ...	287,500	163,300	56.8	120,175	41.8	37,950	13.2	5,175	1.8
Panama ...	207,900	126,195	60.7	101,455	48.8	22,453	10.8	2,287	1.1
Total ...	2,524,400	1,801,341	71.4	1,176,656	46.7	538,473	21.3	86,212	3.4

SOURCE: Informe Sobre El Estado Actual De Nutricion
En La Republica De Panama

Table 28a

ESTIMATED FOOD REQUIREMENTS FOR PANAMA - 1965

Food	Minimum adequate daily diet grams/person	Miniumum production population demand thousands kg.	Annual production thousands kg.	Percent sufficiency of production	Need not satisfied
Milk	300	139,325	71,095	51	68,230
Eggs	25	11,610	5,131	44	6,479
Meat	90	41,797	26,000	59	15,797
Beans	30	13,932	7,200	52	6,732
Green veg.	105	48,764	12,198	25	36,566
Fruits	120	55,730	35,397	64	20,333
Bananas & related	150	69,662	38,744	56	30,918
Roots & Tubers	120	55,730	39,187	70	16,543
Corn	50	23,221	82,100	354	58,879 +
Wheat (flour)	60	27,865	32,972	118	5,107 +
Rice	180	83,595	134,000	160	50,405 +
Sugars	50	23,221	10,720	46	12,501
Fats	30	13,932	8,991	65	4,941

\+ Excess

++ Imported

SOURCE: INFORME SOBRE EL ESTADO ACTUAL DE NUTRICION EN LA REPUBLICA DE PANAMA February 1970

Table 28b

ESTIMATED FOOD REQUIREMENTS FOR PANAMA - 1970

Food	Minimum adequate daily diet grams/person	Minimum production population demand thousands kg.	Annual production thousands kg.	Percent sufficiency of production	Need not satisfied
Milk	300	164,600	98,828	60	65,772
Eggs	25	13,717	7,464	54	6,253
Meat	90	49,380	32,000	65	17,380
Beans	30	16,460	7,567	46	8,893
Green Veg.	105	57,610	17,923	31	39,687
Fruit	120	65,840	39,081	59	26,759
Bananas & related	150	82,300	42,776	52	39,524
Roots & Tubers	120	65,840	44,336	67	21,504
Corn	50	27,433	86,287	315	58,854 +(1)
Wheat (flour)	60	32,920	36,404	111	3,484 +(1)
Rice	180	98,760	182,300	185	83,540 +(1)
Sugars	50	27,433	11,836	43	15,597
Fats	30	16,460	8,991	55	7,469

(1) Excess

(2) Imports

SOURCE: INFORME SOBRE EL ESTADO ACTUAL DE NUTRICION EN LA REPUBLICA DE PANAMA February 1970

Table 28c

ESTIMATED FOOD REQUIREMENTS FOR PANAMA · 1975

Food	Minimum adequate daily diet grams/person	Minimum production population demand thousands kg.	Annual production thousands kg.	Percent sufficiency of production	Need not satisfied
Milk	300	194,625	126,636	65	67,989
Eggs	25	16,219	9,811	60	6,408
Meat	90	58,388	38,000	65	20,388
Beans	30	19,462	7,953	41	11,509
Green Veg.	105	68,119	26,334	39	41,785
Fruit	120	77,850	43,149	55	34,701
Bananas & related	150	97,312	47,228	49	50,084
Roots & Tubers	120	77,850	50,163	64	27,687
Corn	50	32,438	90,689	280	58,251 +(1)
Wheat (flour)	60	38,925	40,193	103	1,268 +(1)
Rice	180	116,775	230,500	197	113,725 +(1)
Sugars	50	32,438	13,068	40	19,370
Fats	30	19,462	8,991	46	10,471

(1) Excess

(2) Import

SOURCE: INFORME SOBRE EL ESTADO ACTUAL DE NUTRICION EN LA REPUBLICA DE PANAMA February 1970

Table 28d

ESTIMATED FOOD REQUIREMENTS FOR PANAMA - 1980

Food	Minimum adequate daily diet grams/person	Minimum production population demand thousands kg.	Annual production thousands kg.	Percent sufficiency of production	Need not satisfied
Milk	300	229,633	154,392	67	75,241
Eggs	25	19,136	12,160	64	6,976
Meat	90	69,890	44,500	64	25,390
Beans	30	22,963	8,359	36	14,604
Green Veg.	105	80,372	36,694	46	43,678
Fruit	120	91,853	47,640	52	44,213
Bananas & related	150	114,816	52,144	45	62,672
Roots & Tubers	120	91,853	56,754	62	35,099
Corn	50	38,272	95,316	249	57,044+(1)
Wheat (flour)	60	45,927	44,376	97	1,551
Rice	180	137,780	278,800	202	141,020+(1)
Sugars	50	38,272	14,428	38	23,844
Fats	30	22,963	8,991	39	13,972

(1) Excess

(2) Import

SOURCE: INFORME SOBRE EL ESTADO ACTUAL DE NUTRICION EN LA REPUBLICA DE PANAMA February 1970

Table 29a

PANAMA: AREA, PRODUCTION AND YIELD FOR MAIZE AND EDIBLE DRY BEANS
1963 - 1967

MAIZE	1963	1964	1965	1966	1967
Area	94	99	105	108	113
Production	77	83	86	86	89
Yield	8.2	8.4	8.1	7.9	7.9

DRY BEANS	1963	1964	1965	1966	1967
Area	25	20	15	22	21
Production	7	5	4	7	7
Yield	2.8	2.5	2.8	3.1	3.3

AREA = 1000 Hectares

PRODUCTION = 1000 Metric Tons

YIELD = 100 Kg./Hectare

SOURCE: FAO Production Yearbook 1968 Vol. 22

Table 29b

PANAMA: IMPORTS OF EDIBLE DRY BEANS AND MAIZE - 1962 - 1967

Dry Beans - Imports	Metric Tons	Value $
1962	3020	629,000
1963	2740	563,000
1964	4170	894,000
1965	3270	685,000
1966	3810	889,000
1967	3460	746,000

Maize - Imports	Metric Tons	Value $
1962	500	30,000
1963	5000	300,000
1964	8300	560,000
1965	2300	190,000
1966	none	-
1967	none	-

SOURCE: FAO Trade Yearbook - Vol. 22

Table 30

PANAMA: DEATHS WITH MEDICAL CERTIFICATION BY RESIDENCY, 1964-1968

RESIDENCY AND AGE	TOTAL DEATHS				DEATHS UNDER 1 YEAR			
	Total	Medical Certification		Without Medical Certification	TOTAL	Medical Certification		Without Medical Certification
		NO.	% of Total			NO.	% of Total	
TOTAL								
1968 (prov)	9,849	5,443	55.3	4,406	2,186	1,197	54.8	989
1967	8,938	4,824	54.0	4,114	2,169	1,114	51.4	1,055
1966	9,184	4,913	53.5	4,271	2,225	1,168	52.5	1,057
1965	8,687	4,769	54.9	3,918	2,110	1,124	53.3	986
1964	8,454	4,438	52.5	4,016	1,975	999	50.6	976
URBAN								
1968 (prov)	3,743	3,564	95.2	179	684	660	96.5	24
1967	3,297	3,125	94.8	172	699	670	95.8	29
1966	3,359	3,176	94.6	183	716	685	95.7	31
1965	3,336	3,190	95.6	146	708	687	97.0	21
1964	3,118	2,958	94.9	160	678	647	95.4	31
RURAL								
1968 (prov)	6,106	1,879	30.8	4,227	1,502	537	35.8	965
1967	5,641		30.1	3,942	1,470	444	30.2	1,026
1966	5,825	1,737	29.8	4,088	1,509	483	32.0	1,026
1965	5,351	1,579	29.5	3,772	1,402	437	31.2	965
1964	5,336	1,480	27.7	3,856	1,297	352	27.1	945

SOURCE: Panama en Cifras, 1969

PANAMA: DEATHS BY CAUSE AND MEDICAL CERTIFICATION, 1967 and 1968

Table 31

CAUSE	1968 Total	1968 Medically Certified	1968 Not Certified	1967 Total	1967 Medically Certified	1967 Not Certified
Dysentery (all forms)	7	7	0	7	7	0
Enteritis	575	329	246	548	294	254
Tuberculosis (all forms)	285	216	69	269	[illegible]	85
Diphtheria	2	2	0	5	4	1
Pertussis	273	40	233	262	60	202
Meningococcal infections	7	[illegible]	0	6	6	0
Polio	2	2	0	8	8	0
Measles	215	63	152	99	30	69
Malaria	19	3	16	21	1	20
Syhillis and its sequelae	12	12	0	10	9	1
All other infectious and parasitic diseases	451	219	232	451	192	259
Tetanus (217)	(100)	(117)	(221)	(81)	(140)	
Other helminthiasis (120)	(33)	(87)	(128)	(30)	(98)	
Other infectious and parasitic diseases (114)	(86)	(28)	(102)	(81)	(21)	
Malignant tumors	613	527	86	572	493	79
Benign tumors and others not specified	30	26	4	32	18	14
Diabetes mellitus	115	107	8	101	94	7
Avitaminoses and other nutritional diseases	105	91	14	113	90	23
Anemias	188	67	121	185	58	127
Meningitis	46	43	3	55	51	4

(31 cont'd)	Total	Medical Certified	Not Certified	Total	Medical Certified	Not Certified
Rheumatic fever	5	5	0	2	2	0
Chronic rheumatic heart disease	37	37	0	23	23	0
Hypertension	112	89	23	116	93	23
Ischemic heart disease	615	600	15	476	463	13
Other heart diseases	206	127	79	148	68	80
Cerebrovascular accidents	545	408	137	540	407	133
Influenza	25	13	12	10	1	9
Pneumonia	549	344	205	553	361	192
Bronchitis, emphysema and asthma	334	72	262	281	52	229
Peptic ulcers	27	17	10	41	30	11
Appendicitis	8	6	2	15	12	3
Intestinal obstruction and hernia	36	30	6	57	45	12
Hepatic cirrhosis	35	34	1	38	38	0
Nephritis and nephrosis	68	62	6	74	57	17
Hyperplasia of te prostrate	10	10	0	17	15	2
Abortion	7	6	1	2	2	0
Other complications of pregnancy delivery, and postpartum	64	32	32	70	31	39
Anomalies Congenital	131	127	4	128	123	5
Birth injuries, dystocias, and other anoxic and hypoxic diseases of those under 1 year	272	246	26	258	221	37

(31 cont'd)

CAUSE	1968 Total	1968 Medical Certified	1968 Not Certified	1967 Total	1967 Medical Certified	1967 Not Certified
Other causes of death for those under 1 year	197	180	17	204	186	18
Symptoms ill defined	1928	122	1806	1668	73	1595
All other illnesses	966	642	324	846	511	335
Accidents, poisonings and other violent deaths	727	473	254	627	411	216
Motor vehicle accidents (180)	(154)	(26)	(131)	(119)	(12)	
Other accidents (364)	(181)	(183)	(200)	(200)	(165)	
Suicide and self inflicted wounds (65)	(45)	(20)	(67)	(50)	(17)	
Other external causes 118						
TOTAL	9849	5443	4406	8938	4824	4114

SOURCE: Panama *en* Cifras, 1969

Table 32

PANAMA: LIVE BIRTHS WITH AND WITHOUT PROFESSIONAL ATTENDANCE AT DELIVERY - 1964-1968

Residency and Year	Total	With Professional Attendance		Without Professional Attendance
		Number	Percent	Number
REPUBLIC				
1968 (prov)	53,053	32,209	60.7	20,844
1967	50,795	30,864	60.8	19,931
1966	49,394	29,074	58.9	20,320
1965	46,978	27,800	59.2	19,178
1964	46,092	26,624	57.8	19,468
URBAN				
1968 (prov)	21,191	20,331	95.9	860
1967	21,196	20,374	96.1	822
1966	19,821	19,023	96.0	798
1965	19,510	18,659	95.6	851
1964	18,925	17,979	95.0	946
RURAL				
1968 (prov)	31,862	11,878	37.3	19,984
1967	29,599	10,490	35.4	19,109
1966	29,573	10,051	34.0	19,522
1965	27,468	9,141	33.3	18,327
1964	27,167	8,645	31.8	18,522

SOURCE: PANAMA EN CIFRAS, 1969

Table 33

PANAMA: IMMUNIZATION COMPLETE BY TYPE OF VACCINE YEARS 1964-1968

Types of Vaccine	1964	1965	1966	1967	1968
Smallpox	39,716	44,756	55,700	42,153	44,935
Tuberculosis	47,575	29,164	29,330	31,956	----
D.P.T.	26,233	30,688	33,062	33,899	26,979
Polio (2)	86,865	5,761	8,958	60,970	14,010
Typhoid and Paratyphoid A & B	2,033	607	1,833	481	275
Yellow Fever	4,536	6,832	5,916	8,379	6,470
Others (3)	331	47	121	445	57

(1) Refers to Completed Series of Immunizations

(2) Includes Immunizations Performed in 1963

(3) Includes Immunizations Against Cholera, Plague, Epidemic Typhus, Rabies, etc.

Source: Panama en Cifras

Table 34

PANAMA: EFFECTIVE PERCENTAGE IMMUNIZATION PROTECTION FOR THE ESTIMATED YOUNG POPULATION INCREASE: SMALLPOX, TUBERCULOSIS AND DPT

	1965		1966		1967		1968	
Type of Vaccine	Estimated Young Population Increase (1)	Percentage Protected (2)	Estimated Young Population Increase(1)	Percentage Protected (2)	Estimated Young Population Increase(1)	Percentage Protected (2)	Estimated Young Population Increase(1)	Percentage Protected (2)
	45,200		47,200		48,500		50,900	
Smallpox		99		118		87		88
Tuberculosis		64		62		66		-
D.P.T.		68		70		70		53

(1) Estimated young population increase calculated from live births respective year minus deaths under one year respective year and rounded to nearest one hundred.

(2) Percentage protected based upon the theoretical situation in which all immunizations for a given year are performed only on the estimated young population increase and provide life-long immunity. See text for full explanation

Table 35

PANAMA: BEDS (1) IN HOSPITALS AND INTEGRATED MEDICAL CENTERS BY PROVINCE AND FOR THE CITIES OF PANAMA AND COLON, 1964 - 1968

Province and City	1964		1965		1966		1967		1968	
	Total	Rate 10,000 Population (2)	Total	Rate 10,000 Population (2)	Total	Rate 10,000 Population (2)	Total	Rate 10,000 Population (2)	Total	Rate 10,000 Population (2)
Total	4,304	3.8	4,434	3.8	4,242	3.5	4,286	3.4	4,440	3.4
Bocas del Toro	192	8.2	192	7.8	196	7.6	167	6.2	176	6.3
Cocle	171	1.7	173	1.6	174	1.6	154	1.4	156	1.4
Colon (3)	230	2.5	210	2.2	161	1.7	174	1.8	299	3.0
Colon City	230	3.7	210	3.3	161	2.5	174	2.7	299	4.6
Chiriqui	419	2.2	431	2.2	424	2.1	467	2.2	474	2.2
Darien	44	2.8	53	3.3	54	3.2	54	3.1	56	3.2
Los Santos	171	2.3	185	2.4	187	2.4	214	2.7	184	2.3
Panama (3)	2,839	6.5	2,935	6.4	2,800	5.9	2,785	5.6	2,721	5.2
Panama City	2,519	8.0	2,620	7.9	2,477	7.2	2,462	6.9	2,405	6.4
Veraguas	129	0.9	140	1.0	141	1.0	178	1.2	173	1.1

(1) Includes nursery bassinettes

(2) Respective midyear population estimates-excludes "indigenous" population

(3) Includes the respective city

SOURCE: PANAMA EN CIFRAS, 1969

Table 36

NUMBER AND CAPACITY OF MEDICAL INSTITUTIONS OPERATING IN THE REPUBLIC OF PANAMA : 1960 and 1967

Institutions	1960 No.	1960 Beds	1967 No.	1967 Beds
Hospitals & Clinics				1/
Hospitals	28	4,254	14	3,199
Private	12	586	9	532
Public	16	3,708	5	2,667
Integrated Medical Centers 2/	-	-	14	1,095
Centers of Health	32	46	38	133
Polyclinics & Clinics				
Pediatric Centers	4	-	13	-
Health Sub-Centers	34	-	109	-
TOTAL	98	4,340	188	4,427

1/ Preliminary figures, includes cradles

2/ Union of a hospital with a health center

SOURCE: Analisis de la Situacion de Salud Actual en la Republica de Panama y Proyecciones Futuras, Ministerio de Salud, 1969

Table 37a

PANAMA: PRACTICING PHYSICIANS BY PROVINCE AND FOR THE CITIES OF PANAMA AND COLON, 1964 - 1968

Province and City	1964		1965		1966		1967		1968 (prov.)	
	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/ 10,000 Population (1)
Total	534	4.6	586	5.0	639	5.2	644	5.1	702	5.4
Bocas del Toro	8	3.4	7	2.8	7	2.7	9	3.4	9	3.2
Cocle	19	1.8	22	2.1	27	2.5	22	2.0	22	1.9
Colon (2)	37	4.0	38	4.0	40	4.1	35	3.6	42	4.2
Colon City	36	4.0	37	5.9	39	6.1	35	5.4	42	6.5
Chiriqui	55	2.8	50	2.5	65	3.2	62	2.9	58	2.6
Darien	3	1.9	3	1.9	2	1.2	2	1.2	2	1.1
Herrera	17	2.5	19	2.8	19	2.7	21	2.9	22	3.0
Los Santos	16	2.1	15	2.0	16	2.0	16	2.0	23	2.8
Panama (2)	359	8.3	415	9.1	445	9.3	462	9.3	512	9.9
Panama City	343	10.8	392	11.9	422	12.3	442	12.3	491	13.2
Veraguas	20	1.4	17	1.2	18	1.2	15	1.0	12	0.8

(1) Rates based upon midyear population estimates for each respective year excludes "indigenous" population

(2) Figures include respective city

SOURCE: PANAMA EN CIFRAS, 1969

Table 37b

PANAMA: PRACTICING NURSES BY PROVINCE AND FOR THE CITIES OF PANAMA AND COLON, 1964 - 1968

Province and City	1964		1965		1966		1967		1968 (prov)	
	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)
Total	790	6.9	800	6.8	860	7.0	924	7.3	996	7.6
Bocas del Toro	11	4.6	13	5.3	13	5.1	14	5.2	16	5.7
Cocle	22	2.1	29	2.7	26	2.4	33	3.0	31	2.7
Colon (2)	54	5.8	53	5.6	56	5.8	63	6.5	63	6.3
Colon City	54	8.6	52	8.3	55	8.7	63	9.8	63	9.7
Chiriqui	64	3.3	56	2.8	84	4.1	82	3.9	110	5.0
Darien	4	2.5	5	3.1	4	2.4	6	3.5	5	2.8
Herrera	23	3.4	22	3.2	18	2.5	22	3.0	25	3.4
Los Santos	14	1.8	12	1.6	16	2.0	21	2.6	26	3.2
Panama (2)	584	13.5	594	13.1	623	13.1	662	13.3	696	13.4
Panama City	544	17.1	554	16.8	582	16.9	623	17.4	654	17.5
Veraguas	14	1.0	16	1.1	20	1.4	21	1.4	24	1.6

(1) Respective midyear population estimates - excludes "indigenous" population

(2) Includes the respective city

SOURCE: PANAMA EN CIFRAS, 1969

Table 37c

PANAMA PRACTICING DENTISTS BY PROVINCE AND FOR THE CITIES OF PANAMA AND COLON, 1964 - 1968

Province and City	1964		1965		1966		1967		1968 (prov.)	
	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)	Total	Rate/10,000 Population (1)
Total	106	9.3	110	9.3	111	9.3	121	9.6	127	9.7
Bocas del Toro	1	4.3	1	4.1	1	3.9	1	3.7	1	3.5
Cocle	4	3.9	4	3.8	4	3.7	5	4.5	7	6.1
Colon (2)	9	9.7	11	11.6	9	9.3	10	10.2	8	8.0
Colon City	9	14.5	11	17.5	9	14.2	10	15.6	8	12.3
Chiriqui	12	6.3	13	6.6	13	6.4	15	7.1	14	6.4
Darien	0	0	0	0	1	6.0	1	5.8	1	5.6
Herrera	6	8.9	6	8.7	6	8.5	7	9.7	6	8.1
Los Santos	4	5.3	4	5.2	4	5.1	5	6.3	5	6.2
Panama (2)	66	15.2	66	14.5	67	14.1	71	14.3	80	15.4
Panama City	63	19.9	64	19.4	64	18.6	67	18.7	77	20.6
Veraguas	4	2.9	5	3.5	6	4.1	6	4.0	5	3.2

(1) Respective midyear population estimates - excludes "indigenous" population

(2) Includes the respective city

SOURCE: PANAMA EN CIFRAS, 1969

Table 38a

MEDICAL STUDENTS AND FACULTY BY COUNTRY FOR LATIN AMERICA: 1967

Country	Number of Schools	Students Matriculated	Full-time exclusive teachers	Student-Faculty Ratio
Argentina	9	27,790	182	152.6
Bolivia	3	2,179	1	2179.0
Brazil *	69	12,529	279	44.9
Chile **	5	2,293	593	3.8
Colombia	9	3,174	717	4.4
Costa Rica	1	188	19	9.8
Cuba ***	3	4,516	177	25.5
Dominican Republic	2	1,109	1	1109.0
Ecuador	4	1,660	8	207.0
El Salvador	1	323	63	5.1
Guatemala	1	551	61	9.0
Haiti	1	416	0	
Honduras	1	176	27	6.5
Jamaica	1	372	63	5.9
Mexico **	22	20,127	219	91.9
Nicaragua	1	245	22	11.0
Panama	1	148	10	14.8
Paraguay	1	272	3	90.6
Peru	7	2,580	330	7.8
Uruguay	1	2,244	33	101.3
Venezuela	7	5,491	523	10.4
Totals	150	88,383	3,330	26.5

* Includes only 24 of the 31 schools with full degree courses

** Includes one school with a non-degree course whose students complete their clinical training in other schools

*** Data for the year 1965.

Source: Medical Education
PAHO Publication prepared for XIX Meeting of the Directing Council, 1969.

Table 38b

LATIN AMERICA: GRADUATES OF MEDICAL SCHOOLS BY COUNTRY

Countries	1963	1964	1965	1966	1967	Annual Growth Rate
Argentina	1,947	2,202	2,282	1,873	2,569	6.8%
Bolivia	95	93	104	129	125	5.4%
Brazil	1,582	1,567	1,784	1,550	2,046	6.3%
Chile	233	236	228	225	233	0.0%
Colombia	439	393	473	392	353	-5.3%
Costa Rica	*	*	11	14	15	
Cuba	334	312	395	400	453	4.3%
Dominican Republic	88	84	14	76	204	19.8%
Ecuador	83	115	146	150	183	18.7%
El Salvador	40	50	39	37	40	0.0%
Guatemala	89	89	63	74	55	-11.1%
Haiti	**	**	**	**	**	
Honduras	26	22	29	42	82	25.9%
Jamaica	32	31	35	34	60	15.2%
Mexico	1,059	1,055	1,471	1,439	1,957	14.8%
Nicaragua	38	18	42	60	49	4.6%
Panama	18	21	25	19	*	
Paraguay	47	**	**	**	47	0.0%
Peru	257	293	420	293	326	5.8%
Uruguay	127	129	178	159	234	14.4%
Venezuela	369	401	397	425	477	6.3%
Totals	6,903	7,111	8,136	7,346	9,455	7.8%

* No students graduated
** Information not obtained
*** A large number of students who had completed the course previously graduated in 1967

Source: Medical Education in Latin America
PAHO Publication prepared for XIX Meeting of the Directing Council, 1969.

Table 38c

LATIN AMERICA: ANNUAL COST PER STUDENT IN 72 MEDICAL SCHOOLS, 1967

Country	Cost U.S. $ [1]	Number of Students	Annual Cost per Student
Argentina	9,004,493.40	25,721	350.08
Bolivia	375,431.88	2,179	172.29
Brazil	10,803,846.95	8,928	1,210.10
Chile	6,448,657.32	2,159	2,986.87
Colombia	2,461,846.16	2,941	837.07
Costa Rica	272,972.21	184	1,483.54
Dominican Republic	769,808.00	1,009	753.03
Ecuador	292,907.70	1,660	176.45
El Salvador	582,321.92	323	1,802.85
Guatemala	309,465.54	551	561.64
Honduras	137,567.58	176	781.63
Mexico	4,075,352.10	16,287	250.22
Nicaragua	246,969.20	245	1,008.03
Panama	309,425.00	148	2,090.70
Peru	4,124,034.84	2,310	1,785.29
Venezuela	9,996,344.44	4,927	2,028.89
West Indies	1,397,448.47	381	3,667.84

1. Basis of calculation costs plus 10% of investment costs.

Table 39

PANAMA: RADIOGRAPHIC SURVEYS OF THE NATIONAL ANTITUBERCULOSIS CAMPAIGN BY INSTITUTION: 1968

Institution	Number
TOTAL	71,696
Dispensary Amadeo Vicente Mastellari	2,891
Dispensary of Rio Abajo	1,840
Dispensary of Colon	3,747
Dispensary of David	---
Annex of Aguadulce	113
Annex of Chitre	1,182
Annex of Las Tablas	102
Annex of Penonome	2,119
Annex of Santiago	2,471
Annex of Sona	279
Radiographic Surveys in Communities	56,952

--- Data not available

Source: Ministry of Health
National Antituberculosis Campaign
Division of Statistics and Epidemiology

Table 40a

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

A. Organization of Health Services	Description	Funds	Personnel	Duration
1. PAHO/WHO project Panama - 3100 Health Services	Prepare, implement a national health plan. Train personnel needed. Reorganize, improve expand health services. Organize national mental health services.	PAHO/RB-$19,405 WHO/UNDP 50,886 $70,274	1 medical advisor (the PAHO/WHO country rep. 1 san. engineer 1 short-term engineer 1 short-term, 2 long term fellowships	1952-69
2. PAHO project Panama 3700 Health Planning	Introduce planning techniques to integrate health sector within economic and social development programs of Panama	PAHO-RB	1 short-term consultant. Advisory services by PAHO/WHO country rep. & by medical officer assigned to project AMRO-3703	1968
3. USAID project #525-15-530-124 Health Development	Assist Ministry of Health to (1) implement portions of its National Health Plan including improvement of rural health services (2) devise plan to promote better nutrition including nutrition education & utilization of PL 480 commodities by Voluntary Agencies (esp. in school feeding programs)	$3000 in FY 1968 funds - used to purchase limited amount of commodities and pay for publications and service.	No U.S. Staffing	FY 1967 -FY 1973
4. USAID #525-15-580-142 PASA # LA(HA) 31-67 Population	Assist Ministry of Health and Panamanian Family Planning Association to develop a population program	FY 1968 funds of $475,000 obligated	1 medical officer	FY 1967 -FY 1973

Table 40a (Cont'd)

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

A. Organization of Health Services	Description	Funds	Personnel	Duration
5. PAHO Panama - 4200 Nutrition	Implement coordinated applied nutrition program in selected areas of Panama		Advisory services by HQ staff and INCAP personnel (cooperation w/UNICEF)	1962-69
6. PAHO/WHO Panama - 4200 Food & Drug Control	Expand food & drug control and increase compliance with existing laws; strengthen special analysis labs. of University of Panama which are reference labs for countries of Central America --train personnel	WHO/RB $1,558	2 short-term consultants 3 short-term fellowships Advisory services by HQ & Zone III Office Personnel	1968
7. USAID No. not assigned 6/30/68 Loan # 525-L-029 Rural Mobile Health Program (PUMAR)	Assist GOP to finance drugs medicine, equipment, mobile units and spare parts to conduct a rural mobile health program. Finance addition of 13 new mobile dispensary units to GOP's ongoing program and will equip these units for 3 years 10 vehicles, 3 boats to service 40% of rural pop.- 300,000 people in 90 central villages.	FY 1968 funds of $500,000 (loan) committed-not signed as of 6/30/68 but expected to become operative in FY 1969		

Table 40b

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

B. Disease Control Programs	Description	Funds	Personnel	Duration
1. PAHO Panama 0-400 Tuberculosis Control	Organize and implement control program integrated with local health services		Advisory services by staff of PAHO Headquarters by PAHO/WHO country rep. and by persons assigned to PAHO projects Guatemala 3300 and AMRO-0403 and 0-404	1963-69
2. USAID No. 525-21-510-114 Loan #525-L-023 Malaria Eradication	Intensify and accelerate efforts at malaria eradication by enabling government to conduct 3 year program coordination with similar programs in Central American countries.	No disbursement as of 6/30/68 of loan of $1,440,000 committed in FY 1967 and signed in FY 1968.	—	3 years
3. PAHO/WHO Panama 0-200 Malaria Eradication	Eradicate malaria	PAHO/SMF $33,959 WHO/RB WHO/MESA 69,663 $103,624	1 medical officer 1 sanitary engineer 2 sanitary inspectors	1956 -
4. PAHO Panama - 2300 Aedes Aegypti Eradication	Aedes Aegypti eradication has been completed - last inspection in 6/60	PAHO/RB $16,545		

Table 40c

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

C. Health Education	Description	Funds	Personnel	Duration
1. PAHO/WHO Panama -6200 Medical Education	Strengthen medical education with emphasis on training teachers in basic sciences and on improving basic sciences curriculum	PAHO/RB $3,010	Advisory by HQ. staff and by PAHO/WHO country rep., 1 short term, 2 long term fellowships	1965-
2. PAHO/WHO Panama -6300 Nursing Education	Implement basic nursing studies program and bachelor degree program for graduate nurses. Train faculty of School of Nursing of University of Panama	WHO/RB $8,776	1 short-term consultant and advisory services of country rep. and of nurse assign. to AMRO-3203 1 long term fellowship	1966-71
3. PAHO/WHO Panama -G400 Sanitary Engineering Education	Prepare and hold short courses on topics of current interest in this field, establish labs to strengthen civil engineering education and to train professional and technical sanitary engineering personnel	PAHO/RB $2,776	1 short-term consultant and advisory service by sanitary engineers of Panama 3100 and AMRO-2103	1965-69
4. PAHO Panama-6000 Medical Textbooks and Teaching Materials	Establish system for distribution sale and rental of textbooks		Advisory services by medical officer assigned to AMRO-6000	1967
5. PAHO Panama-6600 Dental Education	Establish School of Dentistry of University of Panama. Design plans to construct physical plan and prepare curriculum		Advisory services by country rep. 3 short-term fellowships	1966-69

Table 40d

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

D. Water Supplies and Sewage	Description	Funds	Personnel	Duration
1. Inter American Development Bank	Loan to Instituto de Acueducto y Aleantarillados Nacionales (IDAAN - a public entity) to construct improvements of water systems in 7 cities and 37 communities and improve sewage works for Chitre (32% complete)	Loan of $3,450,000 (out of total project cost of $5,284,000) at 2 1/4 for 24 years		1970-94
2. Inter American Development Bank	Loan to IDAAN to expand water supply systems for 8 towns (100% complete)	Loan of $2,762,000 (out of $3,835,000) at 2 3/4% for 26 years		1963-89
3. USAID #525-22-521-138 Loan #525-L-028 Panama City, Water	Assist Government to provide urgently needed new, larger water supply for Panama City (not signed by 6/30/68)	$15 million loan authorized from FY 1968 funds but not signed by 6/30/68		
4. USAID #525-22-520-060 Loan #525-L-011 Colon Sewerage	Expand and modernize Colon's storm drainage system. IDAAN is in charge with a U.S. engineering firm supervising construction by private firms (signed 7/16/65)	$.4 million ($.9 million was cut from original loan when some of plans were dropped		

Table 40e

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

E. Fellowships	Description	Funds	Personnel	Duration
1. Rockefeller Foundation	Grant for Panamanian doctor to visit virus labs in South America			1966
2. PAHO/WHO Panama -3101 Fellowships	Fellowships in Health Ed. (12 mos) Health Statistics (1 mo.) maternal and child health (1 mo.) pediatrics (7 for 3 mos.) Public Health Admin. (4 mos.) Public Health Nursing (11 mos.) surgery (12 mos.) TB (3 mos.) water & sewage analysis (11 mos.) water supply systems (11 mos.)	WHO/RB -$30,208 3 of fellowships paid for by other WHO/PAHO programs	8 short-term 5 long-term fellowships	1969
3. British Ministry of Overseas Development	1 scholarship in cytology for a Panamanian to use in Britain			11 mos.
4. British Council (private)	Scholarship to study Obstetrics and Gynecology at an Irish University			1 year

Table 40f

INVENTORY OF EXTERNAL ASSISTANCE HEALTH PROGRAMS FOR : PANAMA

F. Direct Supplies and Miscellaneous	Description	Funds	Personnel	Duration
1. Care	Provides wheelchairs, midwifery kits, construction materials and tools-operates feeding programs under PL 480, distributes donated supplemental food		2 U.S. and 5 local personnel	1953
2. Catholic Relief Services	Donated truck to fishing crop feeds 24,000 in family feeding program - distributes food, clothes, medicine - got motor boat to distribute supplies to islands	at least $10,892 of medical goods from Catholic Medical Mission Board		1962
3. Cooperative League of USA	Helps develop cooperatives with Peace Corps and GOP			
4. CUNA International	Helps develop credit unions		2 U.S. personnel	
5. Gospel Memorial Union	High School for 30 and clinic in Salud			
6. Maryknoll Sisters	Peace Corps nurses give 1st Aid course and trains nurses aides			
7. New Tribes Mission	U.S. personnel provide basic medical care and education for tribes with which they work in an education program			

Table 41

AGENCY FOR INTERNATIONAL DEVELOPMENT:

1971 Project Budget Submission
for Panama

The following are the grant projects, active loans and proposed loans which are to be supported by the Agency for International Development in FY 1971. Also included are the proposed loans for FY 1970, 1971 and 1972. Project and loan numbers are given for additional reference.

GRANT PROJECTS	PROJECT NUMBER
Agricultural Development	525-11-190-070
Labor Development	525-15-410-123
Manpower Training and Utilization	525-15-460-118
Health Development	525-15-530-124
Health and Population	525-16-580-142
Private Higher Education	525-13-660-109
Education Planning	525-11-680-110
Education Development and Implementation	525-11-690-127
Miscellaneous Manpower Training	525-15-690-061
Public Safety	525-11-710-044
Government Admin. and Fiscal Reform	525-11-720-048
Demonstration Community Development	525-15-810-121
National Volunteer Service	525-15-810-122
Urban Development	525-15-899-119
Private Enterprise Development	525-15-910-069
Special Development Activities	525-15-998-101
Technical Support	525-11-999-000
Community Development Foundation	525-15-810-117

Table 41 (cont'd)

AGENCY FOR INTERNATIONAL DEVELOPMENT
1971 Project Budget Submission

ACTIVE LOANS	LOAN NUMBER	PROJECT NUMBER
Cadastral Survey and Natural Resources	525-L-007A	525-21-120-091
Agrarian Reform Resettlement	525-N-022	525-22-121-133
Agricultural Development	525-L-034	525-26-190-152
Trans-Isthmian Highway	525-L-018	525-22-310-152
Panama City Sea Wall	525-N-020	525-22-310-131
Panama City Streets	525-L-025	525-22-310-136
Tocumen and Puerto Pilon Highways	525-L-024	525-22-311-135
Feeder Roads	525-A-002	525-22-312-097
Panama City Bridges and Culverts	525-L-017	525-22-390-128
Malaria Eradication	525-L-023	525-22-511-114
Colon Sewerage	525-L-011	525-22-520-125
Panama City Water	525-L-028	525-22-521-138
Mobile Rural Health (PUMAR)	525-L-029	525-22-530-115
Panama City Water and Sewerage	525-L-019	525-22-590-130
Panama City Water and Sewerage	525-L-026	525-22-590-134
Santa Maria la Antigua University	525-L-031	525-24-660-116
Development Administration	525-L-035	525-71-720-141
Urban Community Development	525-N-021	525-22-830-139
Urban Improvement	525-N-016	525-22-830-126
Urban Development (Panama City)	525-L-032	525-22-830-139
Urban Development (Panama City)	525-L-033	525-22-830-139
Cooperative Housing	525-L-027	525-22-840-113
Private Industrial Development Bank	525-L-014	525-24-920-111
Saving and Loan System	525-L-015	525-26-950-112
Urban Master Planning	525-L-008A	525-21-995-095

Table 41 (cont'd)

AGENCY FOR INTERNATIONAL DEVELOPMENT

1971 Project Budget Submission

PROPOSED LOANS FY 1970

Manpower Training and Utilization	$2,500
National Education Development	7,000
Urban By-Pass Highway, Panama City	2,500
Urban Improvement, Colon	3,000
Co-op Development (inc. Credit Unions)	1,500
Regional Planning	1,000

PROPOSED LOANS FY 1971

General Rural Development (Agricultural Sector)	$7,500
Interior Cities Development	5,000
General Rural Development (Agricultural Sector-Public Markets)	2,500
Panama City Sewage Treatment and Disposal	3,500
Regional Development-Central Provinces Infrastructure	5,000

PROPOSED LOANS FY 1972

National Community Development	$5,000
Industrial Development	4,000
Panama City Streets	3,000
Housing Credit	3,000
Soils and Related Research (Darien)	2,000
Cooperative Housing	2,000

Table 42

PANAMA: GROWTH RATES OF GDP BY SECTORS
Periods 1955-1967 and 1960-1967

SECTORS	Growth Rate 1955-1967	Growth Rate 1960-1967
TOTAL	7.3	8.4
Agriculture, cattle raising, forestry fishing	4.5	6.3
Mining	6.9	8.9
Manufacturing industries	11.3	12.0**
Construction	9.5	8.4
Electricity, gas and water	12.0	11.1**
Transportation and communications	11.9	13.3**
Commerce (wholesale and retail)	8.3	8.9
Banking and other financial enterprises	12.5	13.8**
Housing rental	4.9	4.9
Public administration	8.5	7.9
Public and Private services	4.4	5.1
Services to the Canal Zone	7.8	10.3**

* Prices constant with 1960

** Sectors experiencing most rapid growth

SOURCE: Direccion de Estadistica y Censo, Centraloria General de la Republica.

Table 43

PANAMA: ORIGIN OF THE GROSS DOMESTIC PRODUCT
1956, 1960, 1965 - 1966

(In millions of balboas at 1960 market prices)
(one Balboa = U.S. $1.00)

Activity	1956	1960	1965	1966 [1]
TOTAL	331.1	418.0	621.4	679.0
Agriculture, fishing, forestry and hunting	82.5	95.7	127.4	139.0
Mining and quarry	0.9	1.1	2.0	1.9
Manufacturing	36.5	54.5	98.1	108.2
Construction	16.0	22.9	32.7	38.0
Electricity, gas and water	4.7	8.4	14.3	16.3
Transportation, storage and communication	15.7	21.5	41.4	45.8
Wholesale and retail trade	44.4	57.9	87.8	96.2
Banking, insurance and real estate	6.9	10.3	19.0	22.2
Ownership of dwellings	28.8	34.5	42.5	47.0
Public administration	8.0	11.4	15.7	17.4
Services	61.6	69.4	89.1	92.5
Services rendered to the Panama Canal Zone [2]	25.1	30.4	51.4	55.5

1 Preliminary figures

2 Actual salaries paid residents of the Republic who work in the Canal Zone.

SOURCE: Direccion de Estadistica y Censo as published in Informe Economico--1967, Departamento de Planificacion, Panama City, Panama.

Table 44

PANAMA: POPULATION DISTRIBUTION BY ECONOMIC ACTIVITY: CENSUS OF 1960 and HOUSEHOLD SURVEY, 1968
(In Thousands of Persons)

	1968		1960		Absolute Change 1960-1968	Rate of Increase % 1960-1968
	Number	Percent	Number	Percent		
TOTAL-ALL ACTIVITIES	409	100.0	360	100.0	109	3.9
Agriculture, Forestry, Hunting & Fishing	163	3.9	159	50.0	13	1.0
Remaining Non-Agriculture	246	60.1	150	50.0	96	6.3
Indus. Manufacturing	51	12.5	24	8.0	27	9.8
Construction	19	4.6	10	3.3	9	8.3
Utility Services (Gas Water, Sanitary services, Electricity	33	0.7	1	0.3	2	14.7
Commerce	46	11.2	28	9.4	18	6.4
Trans.,Warehouse and Communications	15	3.7	9	3.9	6	6.5
Services (Govt. and Private)	89	21.8	60	20.0	29	5.0
Government Services	37	9.0	26	8.7	11	4.5
Private Services	52	12.8	34	11.3	18	5.4
Panama Canal Zone	23	5.6	18	6.0	5	3.1

SOURCE: PANAMA EN CIFRAS, 1969

Table 45

PANAMA: SUMMARY OF GOVERNMENT EXPENDITURES BY DEPARTMENT 1964-1968

Department	1968	1967	1966	1965	1964
Total	141,010.8	136,308.2	115,254.4	100,406.5	96,457.3
Ministries, total	102,630.3	93,038.2	80,485.5	68,454.8	66,075.0
National Assembly	2,013.1	2,419.6	1,955.4	1,353.2	1,301.3
Comptroller General	2,378.0	2,110.3	1,851.4	1,627.0	1,530.3
President	1,766.3	1,648.9	1,299.3	1,062.1	941.6
Government & Justice	15,639.9	13,862.5	12,068.9	10,735.6	10,313.5
Foreign Relations	2,587.0	2,630.2	2,201.0	1,695.8	1,329.3
Public Finance	3,605.6	3,285.2	2,742.8	3,240.8	2,062.0
Education	30,500.7	27,718.7	24,729.5	21,376.9	20,719.6
University of Panama	5,191.4	3,054.4	2,636.4	2,350.5	2,161.9
Public Works	11,053.9	10,543.9	9,418.1	7,568.5	7,218.8
Agriculture, Commerce & Industry	5,240.1	4,789.7	3,990.7	3,050.7	2,751.1
Office of Price Regulations	349.1	258.2	204.9	148.0	105.6
Labor, Social Welfare and Public Health	18,300.4	17,695.9	14,799.0	13.085.6	12,492.5
Judiciary	1,382.1	1,226.8		936.0	791.5
Public Ministry	916.1	828.9	734.5	611.1	437.4
Electoral Tribune	1,561.1	867.9	567.2	479.7	1,791.0
Unexpected Costs	135.5	97.1	105.9	133.3	127.6
Other	38,380.5	43,270.0	34,768.9	31,951.7	30,382.3

SOURCE: PANAMA EN CIFRAS, 1969

Table 46a

PANAMA: NATALITY, MORTALITY, AND POPULATION GROWTH OF THE REPUBLIC:1964-1968

RESIDENCY AND YEAR	LIVE BIRTHS		DEATHS						NATURAL INCREASE	
			All Causes		Under 1 Year		Maternal			
	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.
Republic										
1968 (prov)	53,053	38.7	9,849	7.2	2,186	41.2	71	1.3	43,204	31.5
1967	50,795	38.2	8,938	6.7	2,169	42.7	72	1.4	41,857	31.5
1966	49,394	38.4	9,184	7.1	2,225	45.0	73	1.5	40,210	31.3
1965	47,351	39.4	8,739	7.3	2,116	44.7	74	1.6	38,612	32.1
1964	46,516	39.9	8,538	7.3	1,984	42.6	75	1.6	37,978	32.6

SOURCE: Panama en Cifras, 1969

Table 46b

PANAMA: NATALITY, MORTALITY AND POPULATION GROWTH OF THE URBAN AREAS: 1964-1968

RESIDENCY AND YEAR	LIVE BIRTHS		DEATHS						NATURAL INCREASE	
			All Causes		Under 1 Year		Maternal			
	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.
URBAN										
1968 (prov)	21,191	33.2	3,743	5.9	684	32.3	17	0.8	17,448	27.8
1967	21,196	34.8	3,297	5.4	699	33.0	6	0.3	17,889	29.4
1966	19,821	34.1	3,359	5.8	716	36.1	11	0.6	16,462	28.3
1965	19,510	35.2	3,336	6.0	708	36.3	13	0.7	16,174	29.2
1964	18,925	36.5	3,118	6.0	678	35.8	17	0.9	15,807	30.5

SOURCE: Panama en Cifras, 1969

Table 46c

PANAMA: NATALITY, MORTALITY AND POPULATION GROWTH OF THE RURAL AREAS: 1964-1968

RESIDENCY AND YEAR	LIVE BIRTHS		DEATHS						NATURAL INCREASE	
			All Causes		Under 1 Year		Maternal			
	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.
RURAL										
1968 (prov)	31,862	43.3	6,106	8.3	1,502	47.1	54	1.7	25,756	35.0
1967	29,599	41.1	5,641	7.8	1,470	49.7	66	2.2	25,958	33.3
1966	29,573	41.9	5,825	8.2	1,509	51.0	62	2.1	23,748	33.7
1965	27,841	43.0	5,403	8.4	1,408	50.6	61	2.2	22,438	34.6
1964	27,591	42.6	5,420	8.4	1,306	47.3	58	2.1	22,171	34.2

SOURCE: Panama en Cifras, 1969

Table 46d

PANAMA: NATALITY, MORTALITY AND POPULATION GROWTH OF PANAMA CITY: 1964-1968

RESIDENCY AND YEAR	LIVE BIRTHS		DEATHS						NATURAL INCREASE	
			All Causes		Under 1 Year		Maternal			
	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.
PANAMA CITY										
1968 (prov)	12,679	34.0	2,232	6.0	386	30.4	8	0.6	10,447	28.0
1967	13,004	36.3	1,994	5.6	417	32.1	5	0.4	11,010	30.7
1966	11,983	34.9	2,019	5.9	416	34.7	4	0.3	9,964	29.0
1965	11,754	35.6	2,024	6.1	425	36.2	7	0.6	9,730	29.5
1964	11,224	35.2	1,716	5.4	333	29.7	9	0.8	9,508	29.8

SOURCE: Panama en Cifras, 1969

Table 46e

PANAMA: NATALITY, MORTALITY AND POPULATION GROWTH OF COLON CITY: 1964-1968

RESIDENCY AND YEAR	LIVE BIRTHS		DEATHS						NATURAL INCREASE	
			All Causes		Under 1 Year		Maternal			
	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.	Total	Rate 1000 pop.
CITY OF COLON										
1968 (prov)	2,179	33.6	556	8.6	75	34.4	2	0.9	1,623	25.0
1967	2,249	35.0	505	7.9	72	32.0	1	0.4	1,744	27.1
1966	2,120	33.4	558	8.8	101	47.6	2	0.9	1,562	24.6
1965	2,224	35.4	573	9.1	101	45.4	3	1.3	1,651	26.3
1964	2,284	36.4	582	9.3	121	53.0	2	0.9	1,702	27.1

SOURCE: Panama en Cifras, 1969